

AD-A165 088

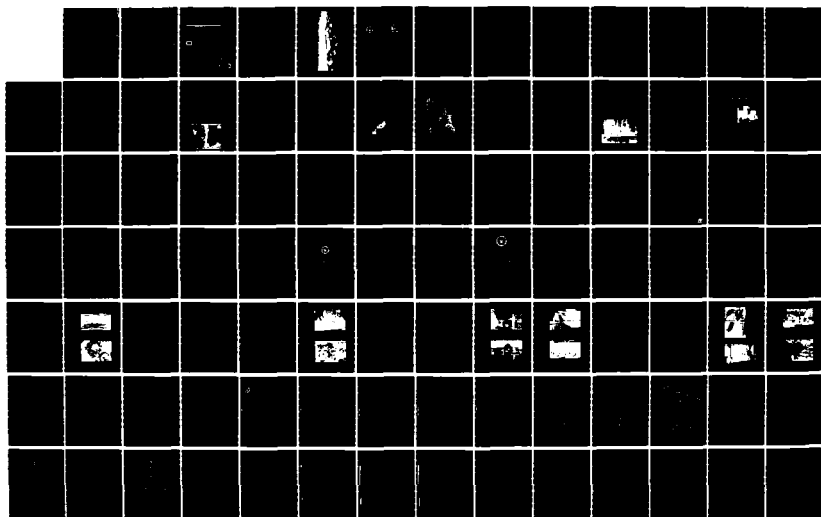
INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS
WASTE AT DOD FACIL. (U) CH2M HILL RESTON VA
T E HIGGINS ET AL. DEC 85 DACA87-84-C-0076

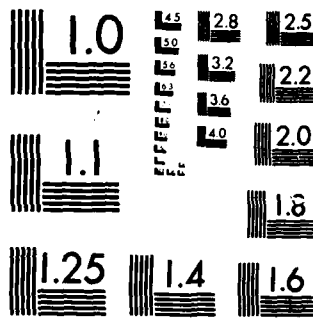
1/3

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS --			
2a. SECURITY CLASSIFICATION AUTHORITY --			3. DISTRIBUTION/AVAILABILITY OF REPORT Unlimited			
4b. DECLASSIFICATION/DOWNGRADING SCHEDULE --			5. MONITORING ORGANIZATION REPORT NUMBER(S) --			
1. PERFORMING ORGANIZATION REPORT NUMBER(S) --			5. MONITORING ORGANIZATION REPORT NUMBER(S) --			
a. NAME OF PERFORMING ORGANIZATION CH2M-Hill Consultants		6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION Defense Environmental Leadership Project			
c. ADDRESS (City, State, and ZIP Code) Reston, VA 22091			7b. ADDRESS (City, State, and ZIP Code) 1717 H Street NW Room 202 Washington, DC 20006			
a. NAME OF FUNDING/SPONSORING ORGANIZATION Defense Environmental Leadership Project		8b. OFFICE SYMBOL (if applicable) DELP	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER --			
c. ADDRESS (City, State, and ZIP Code) 1717 H Street NW Room 202 Washington, DC 20006			10. SOURCE OF FUNDING NUMBERS			
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
1. TITLE (Include Security Classification) Industrial Processes to Reduce Generation of Hazardous Waste at DoD Facilities - Phase 3 Report						
12. PERSONAL AUTHOR(S) Dr. Thomas E. Higgins, Dr. Brian P.J. Higgins						
13a. TYPE OF REPORT Summary		13b. TIME COVERED FROM 1984 TO 1985		14. DATE OF REPORT (Year, Month, Day) December, 1985		15. PAGE COUNT
16. SUPPLEMENTARY NOTATION						
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)			
FIELD	GROUP	SUB-GROUP				
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This report is the third for this waste reduction project. It summarizes the results of the project, presents reviews of the workshops, and provides a source of materials prepared for the workshops in the appendices. This report concentrates on the Projects of Excellence. The three cases selected as Projects of Excellence were: - Plastic Media Paint Stripping at Hill Air Force Base, Ogden, Utah - Innovative Hard Chrome Plating at Pensacola Naval Air Rework Facility, Pensacola, Florida - Centralized Vehicle Washracks and Scheduled Maintenance Facilities at Fort Lewis Army Post, Tacoma, Washington						
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED			
22a. NAME OF RESPONSIBLE INDIVIDUAL AULON TULLER			22b. TELEPHONE (Include Area Code) (202) 653-1273		22c. OFFICE SYMBOL DELP	

AD-A165 088

DTIC
ELECTE
MAR 10 1986
S
R
E

INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS WASTE AT DOD FACILITIES

This appendix is the
PHASE 3 REPORT

project pertaining to
**APPENDIX C - WORKSHOP MANUAL
Centralized Vehicle Wash Racks and
Scheduled Maintenance Facilities at
Fort Lewis, Washington** *for the waste reduction*



prepared for the
DOD ENVIRONMENTAL LEADERSHIP PROJECT
Washington, D.C.

and
U.S. ARMY CORPS OF ENGINEERS
Huntsville, Alabama

CHM HILL
and
PEER CONSULTANTS, Inc.

December 1985

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input checked="" type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

**DTIC
ELECTE**
S **D**
MAR 10 1986
E

86 1 15 085

NOTICE

This report has been prepared for the U.S. Department of Defense (DOD) by CH2M HILL and PEER Consultants, Inc., for the purpose of reducing hazardous waste generation from DOD industrial processes. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency or the Department of Defense.

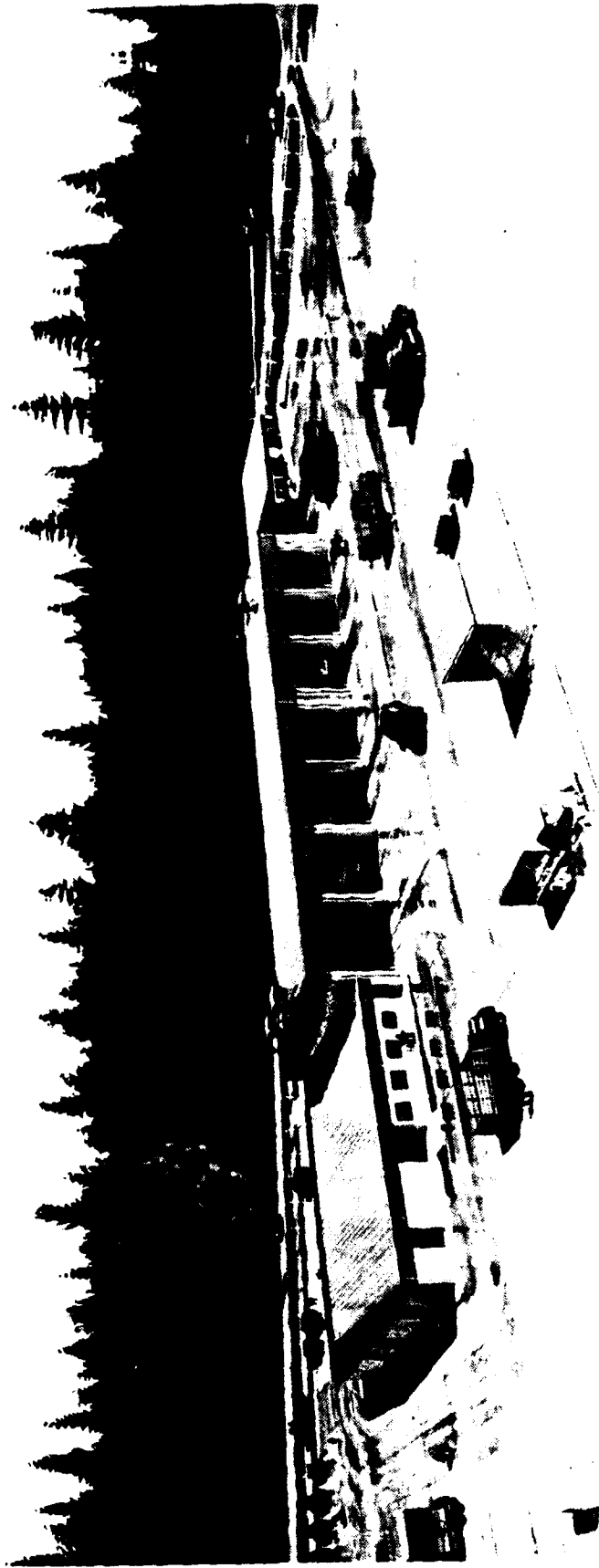
Copies of this report may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with the Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314

This report was prepared by CH2M HILL, Inc., Reston, Virginia, and PEER Consultants, Inc., Rockville, Maryland, under Contract Number DAC A87-84-C-0076, dated August 17, 1984, for the DOD Environmental Leadership Project (DELP) and the U.S. Army Corps of Engineers (COE). CH2M HILL was the prime contractor. PEER was responsible for the preparation and presentation of training workshops at the sites of the Projects of Excellence. Dr. Richard Boubel was the Project Officer for DELP, and Mr. Stan Lee was the COE Project Officer. Dr. Thomas E. Higgins was Project Manager for CH2M HILL, and Dr. Brian P. J. Higgins was Project Manager for PEER. Major contributions were made to this project by Drew P. Desher, Randall Peterson, R. Benson Fergus, J. Kendall Cable, Thomas R. Card, Brian R. Marshall, Daniel Bostrom, and Reid Dennis, of CH2M HILL, and Mary Savage of PEER.



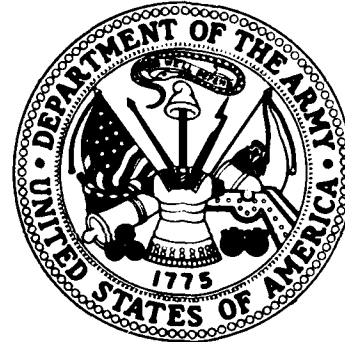
Vehicle Maintenance Shop (Building 3426) Fort Lewis, Washington

The ORB Organization

PROJECT OF EXCELLENCE

CENTRALIZED VEHICLE WASH RACKS AND SCHEDULED MAINTENANCE FACILITIES

FORT LEWIS, WASHINGTON



Phase 3 Workshop

**INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS WASTE
AT DOD FACILITIES**

**Prepared for the
DEPARTMENT OF DEFENSE ENVIRONMENTAL LEADERSHIP PROJECT
WASHINGTON, DC**

and

**U.S. ARMY CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA**

Contract DAC A87-84-C-0076

By

CH2M HILL

RESTON, VIRGINIA

and

PEER CONSULTANTS, INC.

ROCKVILLE, MARYLAND

PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON

CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985

CONTENTS

Agenda

Workshop Response Survey

Participants

Participating Organizations

Workshop Location Maps

1.0 Introduction

2.0 Project Description

3.0 Standardization of Criteria

4.0 Project Requirements

5.0 Production Benefits

6.0 Occupational and Environmental Benefits

7.0 Demonstrations and Tours

Bibliography

Appendix

- 1.0 Policy Documents Concerning DoD Hazardous Waste
- 2.0 Selected References
- 3.0 Equipment Specifications

DISCLAIMER

Mention of specific items of equipment, trade names, consultants, or industries do not constitute an endorsement by the U.S. Department of Defense. Names and addresses are provided only as a convenience for readers of these workshop materials.

**PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON**

**CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985**

AGENDA

Wednesday, October 2

Location: Military Museum Conference Room (Building 13, 2nd Floor)

8:30 AM Introduction and Welcome

Moderator: Brian Higgins, PEER Consultants, Inc.

**Welcome: COL Jack G. McNall, Director of Engineering and
Housing (DEH), Fort Lewis**

**Participants introduce themselves - name, organization, and
responsibilities**

9:00 AM Projects of Excellence Background and Purpose

**Speakers: Richard Boubel, Defense Environmental Leadership
Project (DELP)**

Thomas Higgins, CH2M HILL

Coffee Break

10:15 AM Project History and Description

Speaker: Dave Hanke, Chief, Sanitation Branch, DEH, Fort Lewis

**11:15 AM Videotape: Vehicle Washing and Maintenance Facilities (CERL, 1983,
14:45 minutes)**

11:30 PM Discussion: Questions and Answers

12:00 PM Lunch Break

**1:15 PM Videotape: Plastic Blasting Versus Chemical Paint Removal (U.S.
Technology Corp., 1985, 15 minutes)**

1:30 PM Tour and Demonstration of Facilities:

**DuPont Stormwater Outfall Treatment Facility
Transportation Motor Pool (TMP) Vehicle Washing Facility
Southwest Wash Racks
Southeast Wash Racks
Site Preparation for New \$360 Million Madigan Army
Hospital
Fort Lewis Family Housing**

4:30 PM Adjourn for the Day

AGENDA (continued)

Thursday, October 3

Location: Military Museum Conference Room

8:30 AM Project Significance

**Speaker: Tom Wash, Facilities Engineering Division,
Headquarters, Corps of Engineers**

**8:35 AM Planning and Programming Considerations - Vehicle Wash Racks
and Scheduled Maintenance Facilities**

**Speakers: Walter Medding, Engineering and Construction
Directorate, Headquarters, Corps of Engineers**

**Joseph Matherly, Construction Engineering
Research Laboratory (CERL), Corps of Engineers**

David Hanke, DEH, Fort Lewis

Coffee Break

11:15 AM Summary

Speaker: Brian Higgins, PEER Consultants

11:45 AM Project Funding and Future Directions

Speaker: Richard Boubel, DELP

12:00 PM Lunch Break

1:15 PM Tour of Fort Lewis Military Museum

Guide: Tom Headley, Curator, Fort Lewis Military Museum

1:45 PM Tour and Demonstration of Facilities:

Scheduled Maintenance Facilities

Tracked Vehicles

Wheeled Vehicles

North Fort Wash Racks

Roller Compacted Concrete Test Strip

Wastewater Treatment Plant

4:30 PM Workshop Adjourns

PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON

CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985

WORKSHOP RESPONSE SURVEY (tear out)

Why did you come to the workshop - what did you hope to learn?

Which parts of the program were of most interest to you?

What additional topics should have been covered?

What problems do you foresee in developing centralized vehicle wash racks and centralized maintenance facilities at your installation?

Are there other process modifications with the potential to improve productivity and/or reduce waste generation which you hope to see implemented?

What methods of information/technology transfer do you think would have the greatest chance for success in helping to spread process improvements and new technologies?

Other Comments (Continue on Back)

Name _____

Organization _____

Phone _____

Please Return to:

Brian Higgins

PEER Consultants, Inc.

1160 Rockville Pk, Suite 202

Rockville, MD 20852

PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON

CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985

PARTICIPANTS

Richard W. Boubel, PhD, PE, Project Officer
DOD Environmental Leadership Project
1717 H Street, NW, Room 202
Washington, DC 20006
Phone (202) 653-1273 AV 294-1273

Stan Lee, Contracting Officer's Representative
U.S. Army Engineer Division, Huntsville
ATTN: ED-PM
P.O. Box 1600
Huntsville, Alabama 35807
Phone (205) 895-5803

Joseph E. Matherly, PE, Environmental Engineer
L. Jerome Benson, Environmental Engineer
U.S. Army Corps of Engineers
Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, Illinois 61821
Phone (800) USA-CERL or (217) 373-7233 FTS 958-7233

COL Jack G. McNall, Director of Engineering and Housing
David S. Hanke, Chief, Sanitation Branch
Directorate of Engineering and Housing
AFZH-EHU
Fort Lewis, Washington 98433-5000
Phone (206) 967-5237 AV 357-5237

Thomas E. Higgins, PhD, PE, Project Manager
CH2M HILL
1941 Roland Clarke Place
Reston, Virginia 22091
Phone (703) 620-5200

Brian P.J. Higgins, PhD, PE, Workshop Manager
PEER Consultants, Inc.
1160 Rockville Pike, Suite 202
Rockville, Maryland 20852
Phone (301) 340-7990

Walter S. Medding, Environmental Engineer
Headquarters, U.S. Army Corps of Engineers
DAEN-ECE-G
Pulaski Building, Room 3208
Washington, D.C.
Phone: (202) 272-0415

**PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON**

**CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985**

PARTICIPANTS (continued)

Tom Wash, Environmental Engineer
DAEN-ZCF-U
U.S. Army Corps of Engineers
Headquarters
20 Massachusetts Avenue, NW
Washington, DC 20314-1000
Phone: (202) 272-0589

AV 285-0589

Tom Headley, Curator
Fort Lewis Military Museum
Fort Lewis, Washington 98433
Phone: (206) 967-7206

Richard Pitzen, Foreman
Fort Lewis Wastewater Treatment Plant
DEH
Fort Lewis, Washington 98433
Phone: (206) 967-7453

Richard Lundin, General Manager
ASC Allstate Services Co.
P.O. Box 5430
Lacey, Washington 98503
Phone: (206) 491-4298

(Maintenance contractor and
demonstrator for high pressure,
hot water washers)

Leon Davis, Logistics Management Specialist
HQ DA, ODCSLOG
DALO-SMP-P
Pentagon, Washington, DC 20310
Phone: (202) 697-1543

AV 227-1543

MAJ Thomas R. Butz, Staff Engineer
DCSLOG
HQ FORSCOM
Fort McPherson, Georgia
Phone: (404) 752-4298

AV 588-4298 FTS 243-4298

Guy Dunnavant, Chief Design Review
HQ FORSCOM
AFEN-TSC-R, Building 705
Fort Gillem, Georgia 30050
Phone: (404) 362-7123

AV 797-7123 FTS 256-7123

Ron Nichols, Sanitary Engineer
HQ FORSCOM
AFEN-TSF
Fort Gillem, Georgia 30050
Phone: (404) 362-7140

AV 797-7140 FTS 362-7140

**PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON**

**CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985**

PARTICIPANTS (continued)

Howard Ritchey
National Guard Bureau
Building E6812
Aberdeen Proving Grounds, Maryland 21010
Phone: (301) 671-4712 AV 584-4712

Robert G. Ross
U.S. Army Facilities Engineering Support Agency
FESA-EB
Fort Belvoir, Virginia 22060-5516
Phone: (703) 664-6671 AV 354-6671 FTS 544-6671

Frank Baser, Environmental Engineer
U.S. Army Engineer District, Sacramento
SPKED-A, Room 5543
650 Capitol Mall
Sacramento, California 95814
Phone: (916) 551-2015 FTS 460-2015

Ron Grant
Environmental Coordinator
Directorate for Administration and Services
Anniston Army Depot
Anniston, Alabama 36201
Phone: (205) 235-6155 AV 694-6155

Jim Kemp, Chief of Master Planning
Directorate of Engineering and Housing
Building 1165
Fort Bliss, Texas 79916
Phone: (915) 568-7293 AV 978-7293 FTS 478-7293/7391

Bruce Anderson, Supervisory General Engineer
Judith Hudson, Civil Engineer
Steve Mackmull, Environmental Engineer
Directorate of Engineering
AFZA-DEH
Fort Bragg, North Carolina 28307
Phone: (919) 396-7202 AV 236-7202

Robert Wasitas
Master Planning
AFZB-DEH-E-M
Fort Campbell, Kentucky 42223
Phone: (502) 798-4832 AV 635-4832

**PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON**

**CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985**

PARTICIPANTS (continued)

DeWayne Smith
Energy, Environment & Natural Resources
AFZB-DEH-EE
Fort Campbell, Kentucky 42223
Phone: (502) 798-3487 AV 635-3487

COL Henry T. Brown, Director of Engineering and Housing
Nelson Kelm
AFZC-EH
Fort Carson, Colorado 80913
Phone: (303) 579-3428 AV 691-3428

Richard M. Baker, PE
Directorate of Engineering
ATZT-FE-E
Fort Leonard Wood, Missouri 65473
Phone: (314) 368-4108 AV 581-4108

Steve Glover, Chief, Master Planning
Jennifer McGrath
James Daniels
Carolyn Read
DEH, Master Planning
Fort Lewis, Washington 98433
Phone: (206) 967-2763 AV 357-2763

COL Harry L. Mayfield, Jr., Director of Engineering
MAJ John McDonagh, Organizational Maintenance Officer
Army National Guard
Camp Murray
Tacoma, Washington 98430
Phone: (206) 964-6263 AV 335-7263

Russell Conard
Directorate of Industrial Operations
AFZN-DI-OP
Fort Riley, Kansas 66442-5916
Phone: (913) 239-2126 AV 856-2126

Steve Anschutz, Chief, Environmental Division
DEH
Fort Sill, Oklahoma 73503
Phone: (405) 351-2715 AV 639-5842

Bill Lewis, Chief, Public Works Division
DEH
Fort Sill, Oklahoma 73503
Phone: (405) 351-5115 AV 639-5115

PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON

CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985

PARTICIPANTS (continued)

Serge Saltiel, Master Planning
DEH
Fort Sill, Oklahoma 73503
Phone: (405) 351-5708

AV 639-5708/5175

Lyle R. Smith
ASA III C/A
Fort Sill, Oklahoma 73503
Phone: (405) 351-6485

AV 639-6485/3485

Rudy Verzuh, Production Engineering Division
Directorate for Maintenance
SDSTE-MAE-S
Tooele Army Depot, Utah 84074
Phone: (801) 833-3148

AV 790-3148

**PROJECT OF EXCELLENCE
FORT LEWIS, WASHINGTON**

**CENTRALIZED VEHICLE WASH RACKS AND
SCHEDULED MAINTENANCE FACILITIES
OCTOBER 2-3, 1985**

PARTICIPATING ORGANIZATIONS

DEFENSE ENVIRONMENTAL LEADERSHIP PROJECT (DELP)

The Department of Defense has undertaken a major environmental program initiative called the Defense Environmental Leadership Project. A Project Office has been staffed to study long-term environmental issues that have important cost and policy implications. The Project will examine both technical and policy issues in order to significantly upgrade DOD's environmental perspective and performance. DELPO is responsible for the development and funding of this project on industrial processes to reduce generation of hazardous waste at DOD facilities.

Contacts: Andres Talts, MS, PE, Office Director
 Richard W. Boubel, PhD, PE, Project Officer
 Defense Environmental Leadership Project
 1717 H Street, NW, Room 202
 Washington, DC 20006
 Phone (202) 653-1273 Autovon 294-1273

CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL)

The Construction Engineering Research Laboratory in Champaign, Illinois, is one of several laboratories operated by the Corps of Engineers to support the military and civil works missions of the U.S. Army. CERL performs research, development, testing, and evaluation (RDT & E) of numerous methods to improve construction, operation, and pollution control activities at Army installations. CERL has been investigating methods to reduce water and solvent use for vehicle washing for more than 10 years. Early attempts to recycle wastewater led to the idea of separating exterior vehicle washing from scheduled maintenance activities. Washing results in large quantities of water with low oil and grease content, while maintenance results in low quantities of water with high oil and grease content. Further refinements reduced or eliminated both solvent use and wastewater generation. CERL's Environmental Division has worked closely with environmental personnel at many installations, especially at Fort Lewis and Fort Polk, to plan, design, and/or construct appropriate vehicle wash racks and scheduled maintenance facilities. Considerable planning has been necessary to adequately resolve problems because facility requirements vary depending on the types of vehicles, soil characteristics, maintenance procedures, effluent limitations, and other site specific conditions.

Contacts: Ravinder K. Jain, PhD, PE, Chief, Environmental Division
 Joseph E. Matherly, PE, Environmental Engineer
 L. Jerome Benson, Environmental Engineer
 Sharon E. Kloster, Environmental Protection Specialist
 U.S. Army Corps of Engineers
 Construction Engineering Research Laboratory
 P.O. Box 4005
 Champaign, Illinois 61820
 Phone (217) 373-7202 FTS: 958-7011

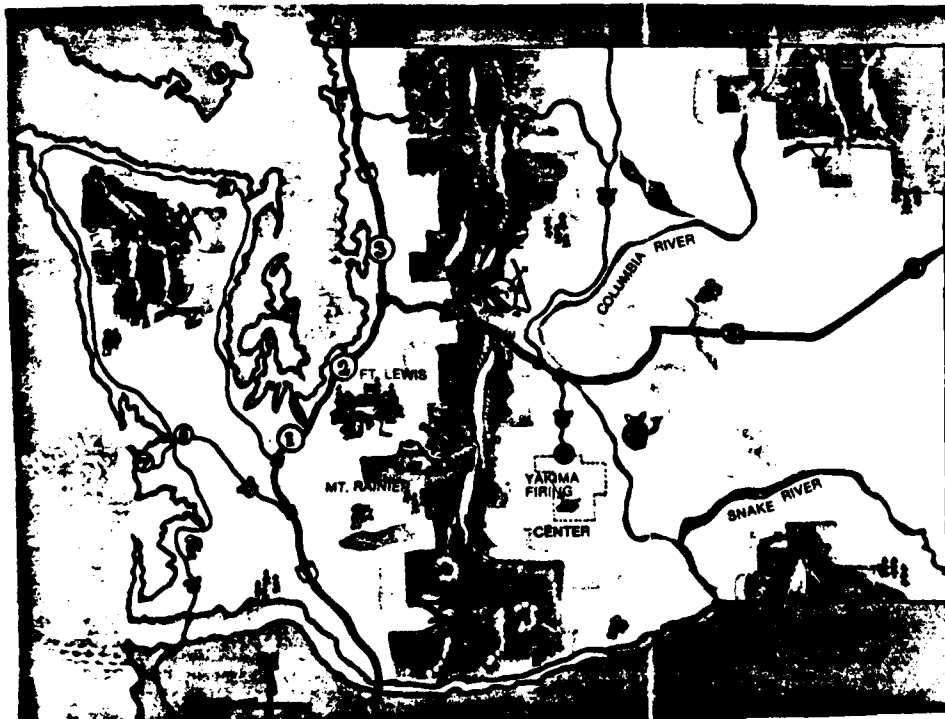
PARTICIPATING ORGANIZATIONS (continued)

DIRECTORATE OF ENGINEERING AND HOUSING (DEH), FORT LEWIS

Fort Lewis is the Army Center of the Pacific Northwest. It contains I Corps Headquarters and the 9th Infantry Division "Old Reliables", a Ranger battalion, a Special Forces group, 4th ROTC Region Headquarters, a number of nondivisional support units, Madigan Army Medical Center, and other tenant organizations. Located on 87,000 acres of woodlands, prairies, and lakes, Fort Lewis is a city in itself, with 832 miles of paved roads, utilities, housing, stores, schools, and recreational facilities, in addition to military training, maintenance, and support activities. About 25,000 soldiers and more than 5,000 civilians are employed at Fort Lewis.

The Directorate of Engineering and Housing is responsible for facilities engineering at Fort Lewis, including upkeep of buildings, grounds and utilities. The Sanitation Section of DEH is responsible for operating and maintaining the facilities for water supply, wastewater collection and treatment, stormwater disposal, solid waste recycling, and sanitary landfilling. Since 1976 DEH and CERL have developed and built state-of-the-art facilities at Fort Lewis to reduce water and solvent use, recycle wastes, and treat discharges from vehicle washing and maintenance facilities. For this reason, the Department of Defense Environmental Leadership Project has selected the Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities at Fort Lewis as the Project of Excellence for the U.S. Army.

Contact: David S. Hanke, Chief
Sanitation Branch
Directorate of Engineering and Housing
Fort Lewis, Washington 98433
Phone (206) 967-5461/6762 Autovon 357-5461



PARTICIPATING ORGANIZATIONS (continued)

OFFICE CHIEF OF ENGINEERS, FACILITIES ENGINEERING DIVISION,
UTILITIES BRANCH, SANITARY SECTION (DAEN-ZCF-U)

The Sanitary Section has worldwide responsibility for operation and maintenance of Army sanitary systems. This includes air and water pollution abatement, solid waste management, recycling, and resource recovery. The Sanitary Section is the sponsor of AR 420-46 and AR 420-47 and the proponent for all MCA funded sanitary engineering projects, including the Army Pollution Abatement Program.

Contact: Thomas J. Wash, PE
Environmental Engineer
HQ, DA (DAEN-ZCF-U)
20 Massachusetts Avenue, NW
Washington, DC 20314-1000
Phone: (202) 272-0589 AV 285-0589

PARTICIPATING ORGANIZATIONS (continued)

CH2M HILL

CH2M HILL is a consulting engineering firm with over 2,500 employees in more than 40 domestic and foreign offices. The firm specializes in water and waste management and in all types of civil engineering, transportation, industry, energy, and agricultural projects. CH2M HILL provides hazardous waste investigation and remediation services to Federal, State, and local governments, to the military services, and to private industry. CH2M HILL is prime contractor to DELP for this project on industrial processes to reduce generation of hazardous waste at DOD facilities.

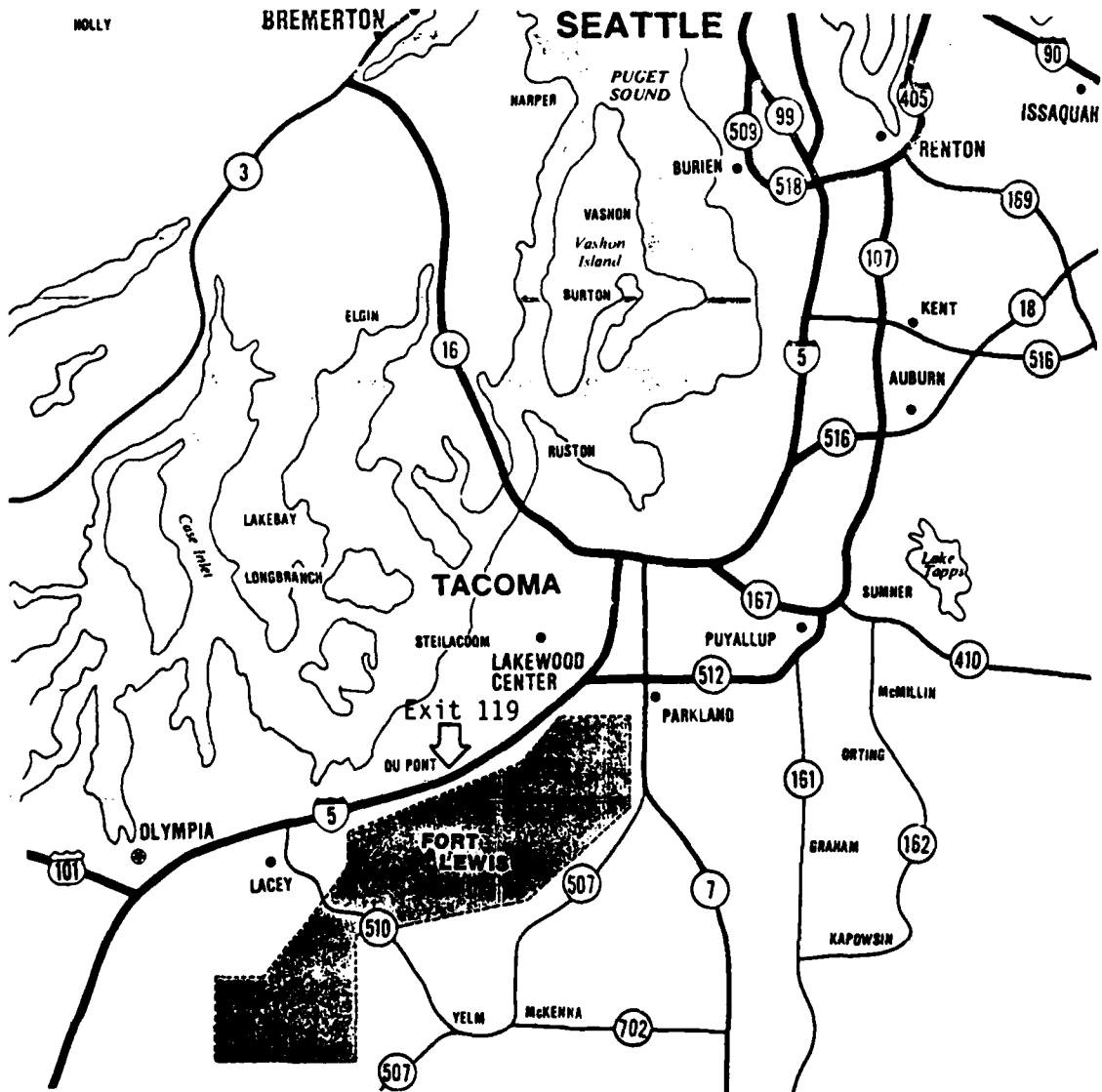
Contacts: Steve Guttenplan, MS, Manager, Industrial Wastes
Thomas E. Higgins, PhD, PE, Project Manager
CH2M HILL
1941 Roland Clarke Place
Reston, Virginia 22091
Phone (703) 620-5200

PEER CONSULTANTS, INC.

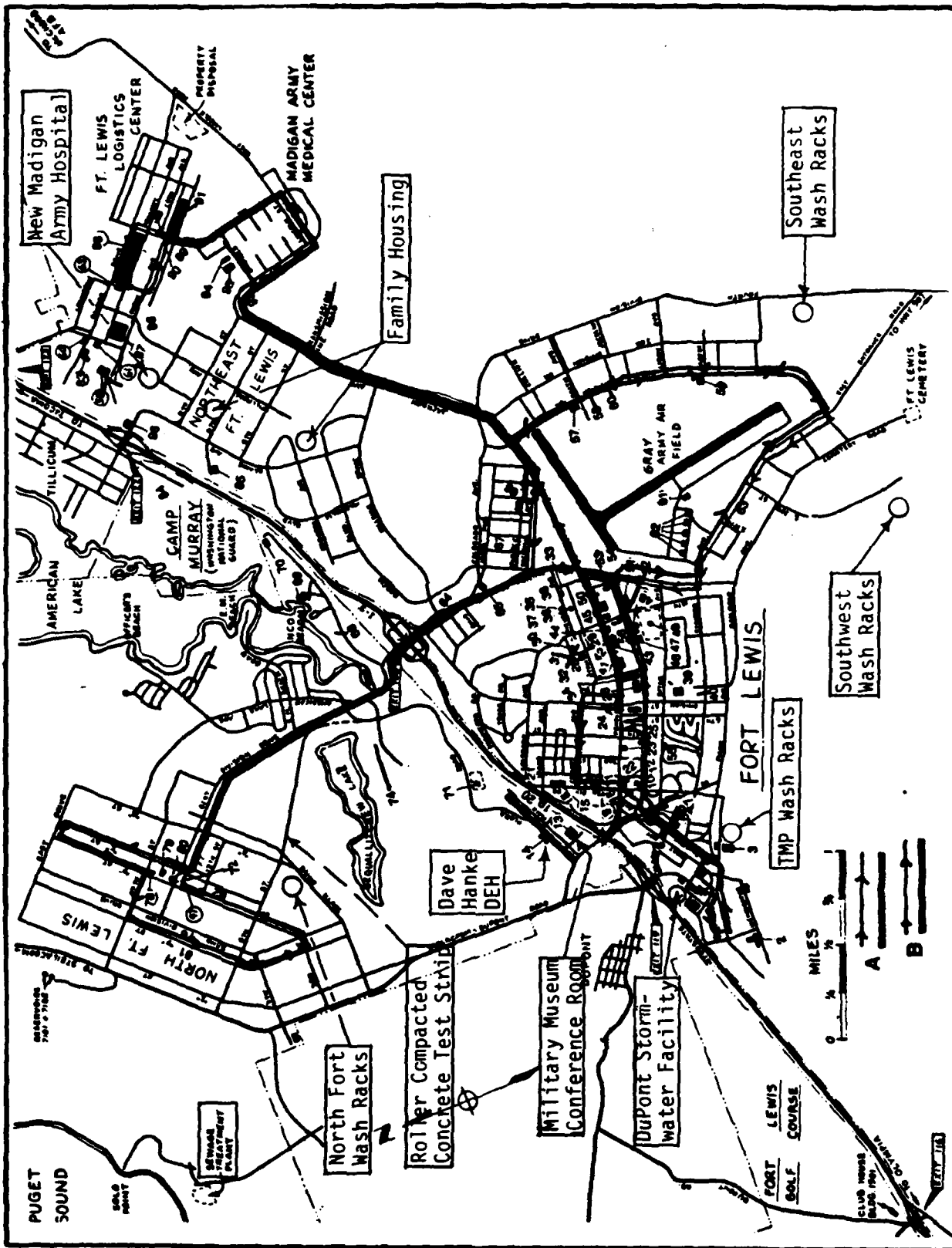
PEER Consultants, Inc., is a civil, chemical, and environmental engineering firm which provides comprehensive professional services in environmental sciences and engineering, water and wastewater systems, solid and hazardous waste management, infrastructure analysis, and information and technology transfer. PEER offices are located in Rockville, Maryland, Washington, DC, Philadelphia, Pennsylvania, and Gary, Indiana. As subcontractor to CH2M HILL, PEER Consultants is responsible for developing and conducting a two-day training program for each of three Projects of Excellence as part of this project on industrial processes to reduce generation of hazardous waste at DOD facilities.

Contacts: Lilia A. Abron-Robinson, PhD, President
Leon W. Weinberger, ScD, PE, Chief Engineer
Brian P. J. Higgins, PhD, PE, Workshop Manager
1160 Rockville Pike, Suite 202
Rockville, Maryland 20852
Phone (301) 340-7990

WORKSHOP LOCATION MAP 1
FORT LEWIS



WORKSHOP LOCATION MAP 2
CONFERENCE ROOM, TOURS, AND DEMONSTRATIONS



KEY TO NUMBERED FACILITIES SHOWN ON WORKSHOP LOCATION MAP 2

Bldg.	Facility		
1. 1401	Laundry	19. 5256	Learning Center
2. 1450	Installation Detention Facility	20. 4280	Garrison Ed Center
3. 1263	Transportation Motor Pool	21. 4274	Youth Center
4. 4174	Finance Office	22. 1015	Scouting Center
5. 1033	Staff Judge Advocate	23. 2014	Main Fire Station
6. 1032	Legal Assistance	24. 5001	Arts & Crafts Center
7.	Magistrate's Court	25. 2022	Jensen Gym
8. 4201	Red Cross	26. 2025	I Corps-Ft. Lewis Hq
9. 1017	LEC Hq (Police Station)	27. 2027	9th Inf Div Hq
10. 2001	Main Post Chapel		Welcome Center, Family Housing,
11. 2003	Comm Center		ACS, ID Cards, AER
12. 2004	French Theater	28. 5170	Military Clothing Store,
13. 4320	Fort Lewis Museum		Donut Shop
14. 4301	Engineering & Housing Hq	29. 5181	IG
15. 4290	Troop Medical Clinic 1	30. 5209	Post Photo Lab
	Alcohol, Drug Abuse Control	31. 5173	Post Office
16. 4219	Ft. Steilacoom CC	32. 5214	Vets Job Info Center
	St. Martin's College	33. 5254	Post Locator, Military Mail
17. 4245	Pacific Lutheran U.	34. 5227	Vehicle Registration
	UPS, USC	35. 5264	Self-Help Center
18. 4258	MOS Library	36. 5282	AFGE Union Hq
37. 5283	Ranger Newspaper	57. 3168	Nelson Rec Center
38. 5292	Pioneer Rec Center	58. 3201	Division Ed Center,
	Info, Tours & Travel		ORU' Hz, Div MOS Library,
39. 2400	Officers Club		Bates Voc-Tech, Video LC
40. 2409	Morale Support, YA Hq	59. 3405	Evergreen Theater
41. 2109	Grandstaff Library	60. 3271	Soldiers Fieldhouse
42. 2150	Rainier Cafeteria	61. 3080	Gray AAF Terminal
43. 2130	Main PX, Mail	63. 3759	Shenden Gym
44. 2130	Bank	64. 3781	3rd Bde Ed Center
45. 2201	Credit Union	65. 6029	Main Gas Station
46. 2160	Physical Fitness Center	66. 6181	Bus Depot, Airlines Office
47. 2161	McVeigh Gym, Kimbro Pool	67. 6695	Foreign Language Lab
48. 2183	Caray Theater	68. 6081	Outdoor Equipment Rental Ctr
49. 2170	Cowan Stadium	69. 6085	NCO Club
50. 2202	Commissary	70. 6087	Hunting & Fishing Center
51. 2272	Bowl Arena	71. 4557	Nature Center (garden plots)
52.	Summit Arena (skating)	72. 2A17	North Fort Ed Center
53. 2240	Pacific NW Bell	73. 14A80	North Handball Courts
54. 2165	Thrift Shop, Nook 'n Cranmy	74. 7901	DRCS
55. 2481	Fort Lewis Preschool	75. 12B14	Chinook Center Performing Arts
56. 2168	Child Care Center	76. 11B31	Carousel Preschool
77. 3A2	Crestline Theater		
78. 3A35	Totem Rec Center		
79. 3A10	North Fort Gym		
80. 3A3	NCO Club Branch 3		
	(Entitled Club)		
81. 12CA1	Gymnastic Center		
82. 10A6	Totem Library		
83. 6603	Civilian Personnel Office		
84. 6129	District Engineer Office		
85. 6403	Indoor Range		
86. 6680	Log Center Gym		
87. 6680	Maintenance Division		
88. 6630	Supply Division		
89. 6640	Central Issue Facility		
90. 6641	TASC		
91. 6685	Self-Service Store		
92. 6600	Madigan AMC Hq		
93. 66	MAAMC Emergency		
94. 6682	Madigan Theater		
95. 6683	Madigan Gym, Pool		
96.	PX Gas Station		

RECOMMENDED AREA RESTAURANTS

The Rose Room - 591-4155. Located on the top floor of the Sheraton Hotel in downtown Tacoma. (Formal). 13th & Broadway

Stanley and Seaforts - 473-7300. Located in Downtown Tacoma. 115 E 34th. Very good prime rib. With a view of Tacoma.

Tacoma Salmon House - 627-0141. Located in Downtown Tacoma. 2611 Pacific Ave. Known for its alder-smoked salmon. (Casual) Northwest Indian decor.

The Following Restaurants are located on Ruston Way, which a view of the water.

The Lobster Shop - 759-2165. 4013 Ruston Way. Known for excellent seafood. Nautical

The Bay Co. - 752-6661. 3327 Ruston Way. Various entrees.

CI Shenanigans - 752-8811. 3017 Ruston Way. Various entrees with a dance floor upstairs.

Harbor Lights - 752-8600. 2761 Ruston Way. Older casual restaurant with large selection of seafood.

Crazie Caffe Italiano - 627-0231. 2301 N 30th. Good Italian food.

Lakewood Terrace - 588-5215. Located in Lakewood, off of Bridgeport/McChord exit. 6114 Motor SW. European Cuisine.

E. R. Rogers - 582-0280. Located in Steilacoom, in a Historic 1891 Mansion, with a view of the water. Very good prime rib. 1702 Commercial Steilacoom.

Lorenzo's - 272-3331. 2811 6th Ave. Good Italian food with casual setting.

Yen Ching Restaurant - 582-3400. 8765 S Tacoma Way. Chinese Mandarin & Szechuan Cuisine.

Places with dancing and food.

Leslie's - 582-4118. 9522 Brideport Way SW.

Raintree - 535-4044. 8620 Hosmer

Quarterdeck - 531-5933. 1234 S Pacific Ave.

Summer Sands - 564-6387. 2401 Mildred W.

Captains Nemo's - 564-6460. 4020 Bridgeport Way W

Black Angus - 582-6900. 9905 Bridgeport Way SW

Places with food and fun bars.

El Torito Restaurant and Cantina - 473-7676. 4801 S Ferrv. Casual with Mexican food.

Chi-Chi Mexican Restaurante - 473-6434. 2205 S 40th. Casual with Mexican food.

The Purple Rhino - 582-6330. 10115 S Tacoma Way.

Red Robin - 473-7447. 3901 S Steele.

1.0 INTRODUCTION

1.1 Welcome

1.2 Background

- 1.2.1 Environmental Laws and Regulations
- 1.2.2 The Resource Conservation and Recovery Act
- 1.2.3 Federal Compliance With Pollution Control Standards
- 1.2.4 DoD Policies Regarding Hazardous Waste

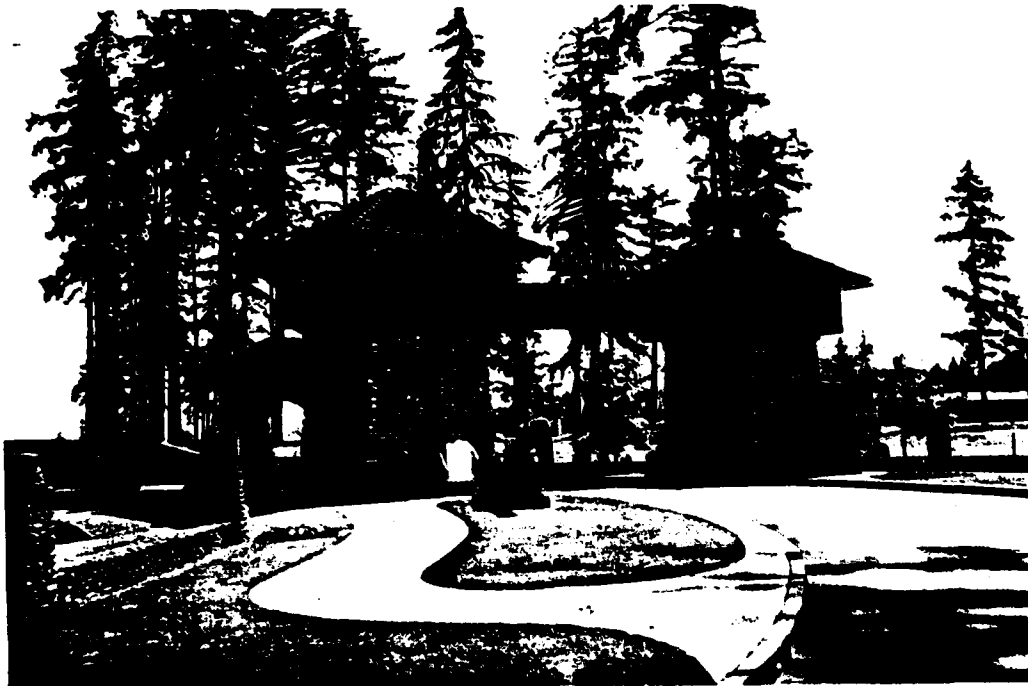
1.3 The Defense Environmental Leadership Project

1.4 Project Goals and Procedures

- 1.4.1 Phase 1: 40 Case Studies
 - Features of Successful Process Modifications
 - Phase 1 Evaluation Results
- 1.4.2 Phase 2: 18 Case Studies
- 1.4.3 Phase 3: 3 Projects of Excellence

1.5 General Recommendations for Successful Process Modifications

Presentation by Richard Boubel, Project Officer, DELP
Defense Environmental Leadership Project (DELP)
Productivity Enhancing Capital Investments (PECI) Program



Monumental Main Gate, Fort Lewis, Washington

1.0 INTRODUCTION

1.1 Welcome

Welcome to Fort Lewis for a Project of Excellence Workshop on Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities sponsored by the Department of Defense Environmental Leadership Project. The purpose of this program is to thoroughly inform selected Army decision-makers about a significant development in vehicle cleaning and maintenance operations which has tremendous potential for:

- o Increasing productivity
- o Improving morale and the quality of training
- o Reducing demands on potable water and wastewater treatment
- o Reducing the generation of hazardous wastes, and
- o Saving time, money, and effort.

The overall purpose of this workshop is to assure adoption of practical, cost and energy efficient, industrial process modifications to reduce hazardous waste generation at DoD facilities.

This two-day workshop will focus on the following aspects of this Project of Excellence:

- o Background and Purpose
- o Project Description
- o Alternative Technologies
- o Project Requirements
- o Production Benefits
- o Environmental Benefits
- o Demonstrations and Tours

This package of written materials is given to each participant for reading, note-taking, and future reference. The front part of these materials contains the Agenda, Response Survey, List of Participants, Description of Participating Organizations, and Location Maps for the workshop.

Interview With

LTG E.R. Heiberg III

Chief of Engineers and Commander, U.S. Army Corps of Engineers

Q. *Can you cite an example of the Corps' laboratories transferring technology to the Army?*

A. Yes, I can. One example is the consolidated Washrack Facility. In the Fort Polk prototype of this technology, an M1 tank coming in from maneuvers can be cleaned within 10 minutes. This facility saves 500,000 training hours annually. Another consolidated vehicle Washrack Facility exists at Fort Lewis, and Army Forces Command has programmed approximately \$100 million for consolidated Washrack Facilities within the next five years.



Each section corresponds to one or more of the scheduled workshop sessions, demonstrations, and tours. Various audio-visual aids, such as slides, exhibits, and a videotape, will also be used. The program is structured to proceed from an overview of the project to a detailed description of project requirements and benefits and a hands-on demonstration. Sessions consist of sit-down discussions in the mornings and on-site demonstrations and tours in the afternoon.

The program is intended to be informal and flexible so that maximum interest and information can be generated and transferred. All participants are encouraged to ask questions and to contribute relevant observations from their own experience for the benefit of the whole group.

Further information on any aspect of the program can be obtained from the appropriate participants and participating organizations. Names, addresses, and telephone number are listed in the front part of the training materials. All participants are encouraged to send information concerning their past, present, and future experience with measures to reduce hazardous waste generation, both successful and unsuccessful, to the Defense Environmental Leadership Project, for everyone's mutual benefit.

1.2 Background

1.2.1 Environmental Laws and Regulations

During the past 20 years the United states has experienced increased awareness of the impacts of people and technology on the natural and social environment.

In the National Environmental Policy Act of 1969, Congress stated that:

"It is the continuing policy of the Federal Government . . . to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."

Since 1969, Congress has passed and amended numerous laws to protect human health and the environment. Major environmental legislation includes:

1. The Clean Water Act (CWA),
2. The Clean Air Act (CAA),
3. The Toxic Substances Control Act (TSCA),
4. The Resource Conservation and Recovery Act (RCRA), and
5. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund").

The U.S. Environmental Protection Agency (EPA) is primarily responsible for developing regulations to implement and enforce these laws. EPA regulations appear under Title 40 of the Code of Federal Regulations. Many proposals for new and revised regulations appear in the Federal Register as laws change and as understanding of environmental and regulatory processes increases. State and local governments frequently adopt their own laws and regulations for environmental protection.

Many Federal, State, and local regulations require that those who generate wastes or release pollutants to the environment obtain permits to do so. Individuals, businesses, and public agencies are responsible for complying with environmental laws, regulations, and permit conditions which pertain to them. They should comply in order to protect the environment and the health and welfare of society.

1.2.2 The Resource Conservation and Recovery Act

Section 1003 of the Resource Conservation and Recovery Act (RCRA) of 1976 states that: "The objectives of this Act are to promote the protection of health and the environment and to conserve valuable material and energy resources." Subtitle C of RCRA directed the EPA to develop and implement a national program to manage hazardous waste. In response to RCRA, EPA has established:

1. Criteria for the identification and listing of hazardous waste;
2. Regulations for generators and transporters of hazardous waste; and
3. Regulations and permit requirements for facilities which treat, store, or dispose of hazardous waste.

The regulations require extensive labeling, recordkeeping, and reporting practices to control hazardous waste "from cradle to grave."

Once hazardous waste is generated, it is usually difficult and costly to manage. Management methods include recycling, treatment, and disposal. Recycling and treatment often result in some residual hazardous waste which still requires disposal. Disposal methods include landfilling, underground placement, and incineration. Much hazardous waste is currently landfilled, but secure landfills which meet EPA requirements for hazardous waste disposal are few in number, difficult to site, and costly to operate. In addition, there are many concerns about the long-term impacts and risks associated with each method of hazardous waste disposal.

The Hazardous and Solid Waste Amendments of 1984 make RCRA more widely applicable and more stringent in many respects (See Appendix 1.1 of these training materials). For instance, the new provisions include:

1. Bans on placement of bulk liquid hazardous waste in landfills, and on certain other disposal practices;
2. Requirements for double-liners and leachate collection systems at surface impoundments and landfills;

3. Additional requirements for monitoring groundwater and taking corrective actions where needed;
4. Restrictions on a facility's permit life;
5. Authority to add conditions to a permit beyond those provided for in the regulations; and
6. Requirements for generators and owners or operators of treatment, storage and disposal facilities to certify that they have instituted a waste minimization program.

As the management of hazardous waste becomes even more difficult and costly, measures to reduce or entirely eliminate the generation of hazardous waste become more attractive.

1.2.3 Federal Compliance With Pollution Control Standards

Executive Order 12088 (October 13, 1978) states that:

"The head of each Executive agency is responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency. The head of each Executive agency is responsible for compliance with applicable pollution control standards, including those established pursuant to, but not limited to, the following" (See Appendix 1.2):

1. Toxic Substances Control Act,
2. Federal Water Pollution Control Act,
3. Clean Air Act,
4. Noise Control Act, and
5. Solid Waste Disposal Act, as amended (this includes the Resource Conservation and Recovery Act of 1976 and the Hazardous and Solid Waste Amendments of 1984).

EO 12088 requires that each Executive agency cooperate with the EPA Administrator and with State, interstate, and local agencies in the prevention, control, and abatement of environmental pollution. It states that:

"Whenever the Administrator or the appropriate State, interstate, or local agency notifies an Executive agency that it is in violation of an applicable pollution control standard, the

Executive agency shall promptly consult with the notifying agency and provide for its approval a plan to achieve and maintain compliance with the applicable pollution control standard. This plan shall include an implementation schedule for coming into compliance as soon as practicable."

"Exemptions from applicable pollution control standards may only be granted . . . if the President makes the required appropriate statutory determination: that such an exemption is necessary (a) in the interest of national security, or (b) in the paramount interest of the United States."

EO 12088 applies to all facilities and activities under the control of the Department of Defense. Exemptions are not expected to be granted except during mobilization or time of war.

1.2.4 DoD Policies Regarding Hazardous Waste

In May of 1980, the Office of the Assistant Secretary of Defense issued Defense Environmental Quality Program Policy Memorandum DEQPPM 80-5 to provide DoD policy guidance on the disposal of hazardous materials. The Defense Logistics Agency (DLA) was designated the responsible agency within DoD for worldwide disposal of all hazardous materials, except for those categories of materials specifically designated for DoD component disposal. DEQPPM 80-5 (Appendix 1.3) and Chapter XXI of DoD 4160.21-M (Appendix 1.5) assign DoD components and installations with the responsibility to "Where feasible, minimize quantities of hazardous waste through resource recovery, recycling, source separation, and acquisition policies."

In August of 1980, DoD policy memorandum DEQPPM 80-8 affirmed that DoD policy is:

"To limit the generation of hazardous waste through alternative procurement and operational procedures that are attractive environmentally yet are fiscally competitive, (and) . . . to reutilize, reclaim, or recycle resources where practical and thus conserve on total raw material usage." (Appendix 1.4)

In carrying out the intent of these policies, numerous studies have been performed at DoD facilities which recommended modifications to industrial processes to reduce the generation of hazardous wastes at the source, rather than treating the wastes at end-of-pipe treatment facilities. Many of these studies recommended process modifications with excellent cost/benefit ratios. Several of these have been successfully implemented. However, others have either not been implemented or were improperly applied.

1.3 The Defense Environmental Leadership Project

Military installations and programs have often had significant impacts on the environment because of their location, size, and mission. In order to encourage leadership in environmental protection the Department of Defense has undertaken a major environmental program called the Defense Environmental Leadership Project (DELP). A Project Office has been established under the Environmental Policy Directorate of the Office of the Secretary of Defense to study long-term environmental issues that have important cost and policy implications. Project staff are examining both technical and policy issues in order to significantly upgrade DoD's environmental perspective and performance.

In addition to its many other activities, DELP has developed and funded a three-phased project, of which this workshop is a part of Phase 3, to encourage the development and implementation of industrial process modifications which reduce hazardous waste generation at U.S. Army, Navy, and Air Force facilities. The goal of another DELP project is to develop an incentive program so that commanders who adopt environmental protection measures which save government money can retain the money for other activities. DELP is also developing methods to more realistically determine the total costs of DoD hazardous waste treatment, storage and disposal activities.

1.4 Project Goals and Procedures

DELP has been conducting this comprehensive three-phased project since mid-1984. A major goal of the project is to develop an in-depth analysis of both successful and unsuccessful attempts to reduce hazardous waste. Project procedures include:

1. Analysis of sites which have been previously studied for reduction of hazardous wastes by either process modifications or change to alternative processes. Sites include those where recommended modifications have been successfully implemented, as well as those which showed potential benefits, but where no action or inadequate action was taken.

2. Identification of management techniques that cause needed changes to be implemented.

3. Integration of successful techniques into operational procedures that will assure future adoption of practical, cost and energy efficient, industrial process modifications to reduce hazardous waste generation.

The analysis concentrated on a few processes that generate the greatest proportion of DoD hazardous waste. The Defense Department operates industrial facilities to clean, repair, and recondition a wide variety of military equipment, including airplanes, helicopters, ships, wheeled and tracked vehicles, and other weapons systems and equipment. Metal finishing operations are performed on military equipment and their components at more than 100 DoD industrial facilities. Metal finishing operations generate most of DoD's hazardous waste. These operations include:

1. Paint stripping,
2. Solvent cleaning,
3. Metal plating, and
4. Painting

Solvent wastes and toxic metal wastes from these processes are the principal hazardous wastes at DoD facilities.

This analysis of process modifications is being conducted under the assumption that the technology to reduce hazardous waste generation is already in existence. This particular DELP project was not intended to fund technology research, development, or implementation. However, project deliverables, including reports, training materials, and three workshops, are structured to promote technology transfer and to encourage wider use of successful process modifications.

1.4.1 Phase 1: 40 Case Studies

During Phase 1 of the project, 40 cases of industrial process modifications at Army, Navy, and Air Force installations were evaluated, and 18 cases were recommended for further study during Phase 2. As shown in Table 1.1, process modifications involving paint stripping, painting, metal plating, and solvents represented most of the 40 cases. Additional cases involved explosives manufacturing, jet engine test cells, fire fighting equipment, fuel tank cleaning, and purchase and use specifications. Cases were evaluated on the basis of costs, energy consumption, technical practicality, management, incentives, and program monitoring and auditing. The primary factor in evaluating the cases was not whether they had been successful, but whether they were useful as examples of how such processes could be modified.

Many times, the success or lack of success of the modification can be attributed not to the technology, but rather to the management, training, and incentive programs that were developed and put into place along with the technology. The Phase 1 report (CH2M HILL, February 1985) identifies managerial techniques that stimulate acceptance and successful implementation of the selected process modifications.

Table 1.1 Type and Number of Process Modifications
Evaluated in Phase 1.

<u>Type of Operation</u>	<u>Number of Modifications Evaluated</u>			
	<u>Army</u>	<u>Navy</u>	<u>Air Force</u>	<u>Total</u>
Paint Stripping	1	2	1	4
Painting	-	3	2	5
Metal Plating	3	9	1	13
Recycle of Solvents and Other Organic Fluids	1	6	3	10
Explosives Manufacturing	4	-	-	4
Jet Engine Test Cell	-	-	1	1
Fire Fighting Training	-	1	-	1
Fuel Tank Cleaning	-	1	-	1
Purchase & Use Specifications	<u>-</u>	<u>1</u>	<u>-</u>	<u>1</u>
Total	9	23	8	40

Features of Successful Process Modifications

Industrial modifications were generally found to be successful; however, some modifications failed and others could not be adequately evaluated.

While there are specific circumstances and reasons behind the success or lack of success of each modification attempted, two characteristics have been integral parts of each of the successful process modifications and at least one of these elements has been missing from the modifications that have been less than successful. Very simply stated, in process modifications that were successfully implemented, the end user was sufficiently motivated to make the change and the technologies were "elegant in their simplicity." Factors which have motivated personnel included improved production rate or quality, reduced overall costs, decreased manpower requirements, and decreased quantity of hazardous wastes to be disposed of. Technologies that were "elegant in their simplicity" were easy to operate and maintain, reliable, and cost effective. Successfully implemented process modifications combined effective technology and motivated personnel to significantly reduce hazardous waste production by substantially changing the process, substituting raw materials, or recovering and reusing waste by-products.

In general, a number of common features distinguished successful process modifications from those that were not. These features are outlined below:

1. Production people were enthusiastically and actively involved in implementing successful process modifications. This usually required that some incentive be offered by the modification, such as reduced manpower requirements or simplification of the process. The change could not harm product quality, and preferably was an improvement over existing processes.
2. A "champion," who strongly believed in the modification, ramrodded the project, and overcame developmental problems and the inertia that protects existing processes (especially those that function, although they may produce undesirable wastes).

3. Care was taken to tailor the modification to the individual facility. During design and installation, many operations personnel were included to obtain their input and to inspire them to adopt the process change.

4. Support was provided at a sufficiently high level in the chain of command to influence production and environmental policy decisions. Frequently, waste disposal and environmental protection had been viewed as service functions, subservient to the mission of the facility, which was usually production-oriented. Successful modifications usually required the reallocation of resources from production functions to environmental protection. Allocation of manpower slots for environmental protection was particularly difficult to obtain.

5. The technologies tended to require "evolutionary rather than revolutionary" changes. That is, off-the-shelf equipment was adapted to a new application, and special or complex equipment was avoided.

6. Successful modifications were straightforward and simple to operate, thus requiring minimal training for personnel unfamiliar with the technology involved.

7. Process reliability had to be high so as not to adversely affect production. Maintenance requirements were minimal.

8. At facilities where modifications were successful, true costs of hazardous waste disposal were appreciated by management, and were considered in the decision to implement the modifications. At DoD facilities, the Defense Property Disposal Office (DPDO) takes hazardous waste, which must be disposed of off the installation, without charge. This has resulted in a disincentive to production people to reduce their generation of hazardous wastes, since costs of waste disposal are not charged to production activities. At some installations, industrial treatment facilities have been sized to handle the existing waste flow. This has resulted in a disincentive to reduce waste production.

Phase 1 Evaluation Results

Table 1.2 (Table 13.1 from the CH2M HILL Phase 1 Report) shows the assessment of each case, and indicates the 18 cases recommended for further study in Phase 2. Cases were favored in which modifications were seriously attempted, had a widespread application, and had the potential of effecting a significant reduction in hazardous waste generation. Cases recommended for further study in Phase 2 of the project are designated with an asterisk (*).

In all but two cases, the cases earning the highest score under an assessment model were recommended for further study. The two cases earning high scores, but not recommended for further study (Case No. 24, Solvent Recovery at Kelly AFB, and Case No. 22, Dry Media Paint Stripping, Alameda NARF), both failed to offer sufficient information to warrant further evaluation.

Some process modifications were not implemented for immediately obvious and overwhelming reasons, such as lack of money or manpower. For these cases, little additional useful information would be obtainable for further evaluation. Cases were favored in which the modification was seriously attempted, resulting in the production of reports or other information suitable for further analysis.

Some of the cases involved wastes that would not be classified as hazardous under EPA regulations. Since the purpose of this project is to evaluate process modifications to reduce generation of hazardous wastes, these cases were considered to be less useful than those that dealt with hazardous wastes.

An assessment model was prepared to help evaluate cases for consideration for Phase 2 of the project. This model contained the following five criteria:

1. Concrete Example: Was there a modification proposed, and is sufficient information available (i.e. existing operation, reports, conversations with personnel) to perform a detailed study of the modification?

EVALUATION RESULTS (1)

CASE NO.	FACILITY, MODIFICATION	CRITERIA (1)					STUDY VALUE	NOTES (2)	REPORT SECTION
		A	B	C	D	E			
1	Hill AFB, Dry Paint Stripping	1.0	1.0	1.0	1.0	1.0	10.0	S	3.4.1
4	Robins AFB, Solvent Recycle	1.0	1.0	1.0	1.0	1.0	10.0	S	6.4.1
10	Pensacola NARF, Spray Rinse	1.0	1.0	1.0	1.0	1.0	10.0	S	5.4.4
26	Pensacola NARF, Dry Paint Strip	1.0	1.0	1.0	1.0	1.0	10.0	S	3.4.3
5	Tyndall AFB, Solvent Recycle	0.7	1.0	1.0	1.0	1.0	9.4	U b	6.4.2
18	Anniston Army Depot, Plating	1.0	1.0	0.7	1.0	1.0	9.4	S	5.4.7
8	Norfolk NSY, Solvent Recycle	1.0	0.5	1.0	1.0	1.0	9.0	S	6.4.4
24	Kelly AFB, Solvent Recycle	0.5	1.0	1.0	1.0	1.0	9.0	N g	6.4.5
7	Norfolk NARF, Heptane Recycle	1.0	0.7	0.7	1.0	1.0	8.8	U a, c	6.4.3
22	Alameda NARF, Dry Paint Strip	0.3	1.0	1.0	1.0	1.0	8.6	N k	3.4.2
23	Watervliet Army Arsenal, Modern Plating	0.5	1.0	1.0	1.0	0.7	8.4	S	5.4.10
6	Lockheed(USAF), CD Plating	1.0	0.5	0.7	1.0	1.0	8.4	S	5.4.1
16	Tobyhanna AAP, Waste Treatment	1.0	0.5	0.7	1.0	1.0	8.4	S	5.4.6
27	Pensacola NARF, Water Primer	1.0	0.5	0.7	1.0	1.0	8.4	S	4.4.3
39	Anniston Army Depot, Solvent Recycle	1.0	0.5	0.7	1.0	1.0	8.4	S	6.4.9
33	NARF's IVD of Aluminum	1.0	0.7	0.7	1.0	0.7	8.2	S	5.4.13
2	Hughes (USAF), Powder Coating	1.0	0.5	0.5	1.0	1.0	8.0	S	4.4.1
3	Lockheed (USAF), Painting	0.7	0.3	1.0	1.0	1.0	8.0	U a	4.4.2
40	Norfolk NSY and NARF, Shelf Life	0.5	1.0	1.0	0.5	1.0	8.0	U b	11.4.1
12	Charleston NSY, LICON Unit	1.0	0.5	0.7	1.0	0.7	7.8	U c, d, e, f	5.4.3
9	Pensacola NARF, LICON Unit	1.0	0.5	0.7	1.0	0.7	7.8	U c, d, e, f	5.4.2
14	Radford AAP, Pink Water	1.0	0.7	0.5	1.0	0.3	7.0	S	7.4.3
29	Pensacola NARF, Solvent Recycle	0.3	0.5	0.7	1.0	1.0	7.0	U m	6.4.6
34	Navy, Electrostatic Paint	0.5	0.5	0.5	1.0	0.7	6.4	U e	4.4.3
30	Pensacola NARF, Machine Coolant	1.0	0.3	0.3	1.0	0.5	6.2	U e, l	6.4.10
13	Radford AAP, NO _x Control	1.0	1.0	0.5	0.0	0.3	5.6	U d, h	7.4.1
15	Milan AAP, Pink Water	0.7	0.5	0.3	1.0	0.3	5.6	S	7.4.4
20	Alameda NARF, Rinse Controls	0.3	0.5	0.3	1.0	0.7	5.6	U e, j	5.4.9
25	Holston AAP, NO _x Treatment	1.0	1.0	0.5	0.0	0.3	5.6	U d, h	7.4.2
38	Navy, Fuel Tank Cleaning	0.5	0.5	0.5	0.3	1.0	5.6	U e	10.4.1
28	Pensacola NARF, Epoxy Paint	0.3	0.5	0.3	1.0	0.5	5.2	U f, d	4.4.3
31	Mare Island NSY, Plating	0.3	0.5	0.3	1.0	0.5	5.2	S	5.4.11
19	Alameda NARF, CN Rinse Changes	1.0	0.0	0.0	1.0	0.3	4.6	S	5.4.8
35	NAS's Fire Fighting	1.0	0.3	0.3	0.0	0.7	4.6	S	9.4.1
36	Charleston NSY, Refrigerant	1.0	0.5	0.3	0.0	0.3	4.2	S	6.4.7
17	Anniston Army Depot, Wet Paint Strip	0.0	0.0	0.0	1.0	1.0	4.0	N i	3.4.4
21	NARF Dry Jet Engine Test	1.0	0.0	0.3	0.0	0.5	3.6	S	8.4.1
32	NARF's Water Over MeCl ₂	0.0	0.0	0.0	1.0	0.5	3.0	N i	5.4.12
37	Norfolk NSY, Refrigerant Recycle	0.3	0.5	0.3	0.0	0.3	2.8	U c	6.4.8
11	Pensacola NARF, Cond. Recovery	0.5	0.0	0.0	0.0	0.5	2.0	N g	5.4.5

FOOTNOTES TO TABLE 13.1

(1) Key to evaluation of modifications

Each modification was assigned a score for each of the five criteria applied in evaluating a given modification. The criteria applied, and the five scores possible for each criteria, are shown below. The total score was then doubled to come up with the study value assigned.

Criteria	Weighting Value				
	1.0	0.7	0.5	0.3	0.0
A Concrete Example	Yes		Questionable		No
B Waste Reduction	Major		Moderate		Minor
C Waste Generation	Major		Moderate		Minor
D EPA Hazwaste	Yes		Sometimes		No
E Potential Use	Widespread		Limited		Unique

(2) S Process modification was judged successful in that it accomplished its goal, was cost-effective and sustainable.

U Process modification was judged not successful for reasons delineated under "Notes".

N Process modification was not yet implemented, or there was not sufficient information available to evaluate the modification.

(3) NOTES (Reasons for Lack of Success)

- a Negative impact on product quality.
- b Lack of authority by those attempting to implement the modification.
- c Lack of manpower.
- d Lack of reliability or maintainability.
- e Inappropriate technology application.
- f Required skilled operators.
- g Process evaluation in progress, insufficient information.
- h Process consumables no longer commercially available.
- i No process modification was known to have been proposed.
- j Lack of space to locate the required equipment.
- k Not implemented, pending demonstration results at other facilities.
- l Physical properties of the material to be recycled kept changing.
- m Operation was discontinued due to lack of technical support and incentives to reduce hazardous wastes.

(4) * Recommended for additional study during Phase 2 of the project based on study value and availability of information to evaluate

TABLE 1.2 Phase 1 Evaluation of 40 Case Studies

Source: CH2M HILL, April 1985.

TABLE 13.1

EVALUATION OF CASE STUDIES



2. Waste Reduction: To what extent would the proposed modification, if successful, affect a significant reduction in waste generation at the facility?

3. Waste Generation: At the average facility using the industrial process, how much waste is produced that would be affected by the proposed modification?

4. EPA Hazardous Waste: Would the affected waste be classified as a hazardous waste under EPA regulations? (For a detailed description of EPA hazardous waste regulations and definitions, see 40 CFR Part 261 -- Identification and Listing of Hazardous Waste.)

5. Potential Use: How widely is the process used in the Armed Services? Would the process modification have widespread application?

Notice that the five criteria do not judge the success (or lack thereof) of a given modification. The five criteria were used in Phase 1 to determine which cases would be most valuable for further study in Phase 2. They were also used in Phase 2 to select three Projects of Excellence for the Phase 3 workshops.

The evaluation of whether or not a process modification was successful was separated from the determination of its value as an example for further analysis. To determine if a modification was successfully applied, it was determined whether or not the modification had been implemented as proposed, proved cost-effective, and was sustainable or capable of being carried on indefinitely. Modifications that met these criteria were classified as successful (S). Those process modifications found not to be successful (U) failed for a variety of reasons, which are explained in footnotes (a through m) to Table 1.2. Those modifications for which insufficient information was available, or for which implementation was too early in progress to evaluate, are designated with an N; and the rationale for this designation is also explained in footnotes to Table 1.2.

The 18 cases recommended for further evaluation included 13 that were successful and 5 that were not. By service, there were 3 Army, 6 Air Force and 9 Navy cases, approximately proportional to the distribution of the original 40 cases.

By industrial process, 7 of the cases involved modifications to plating operations, 5 were for modifications to painting or paint stripping, 5 were for modifications to recover solvent, and 1 was to modify purchase and use specifications to reduce disposal of items whose shelf life had expired. Selection of these cases fulfills the objective of the contract to "...focus on a few processes that generate the greatest proportion of DoD hazardous wastes..."

Among the 18 cases, there were numerous candidates for the three "Projects of Excellence" to be selected during Phase 2 of the project.

1.4.2 Phase 2: 18 Case Studies

During Phase 2 of the project, 18 case studies were further evaluated and three Projects of Excellence were selected. Since it was extremely difficult to obtain information about Case No. 23 (Modern Plating System at Watervliet Army Arsenal) and Case No. 40 (Purchase and Use Specifications), they were replaced with two additional Army case studies at the beginning of Phase 2. These process modifications are the Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities at Fort Lewis and Fort Polk (Case Nos. 41 and 42).

The 18 case studies were ranked according to their study value and application success as shown in Table 1.3 (Table 6-1 from the CH2M HILL Phase 2 Report). The three top-ranked cases were selected for Phase 3.

TABLE 1.3 Phase 2 Evaluation of 18 Case Studies

TABLE 6-1 EVALUATION OF CASE STUDIES

REPORT SECTION	FACILITY, MODIFICATION	STUDY VALUE					STUDY SCORE	APPLICATION SUCCESS										SUCCESS SCORE	TOTAL SCORE
		A	B	C	D	E		F	G	H	I	J	K	L	M	N	O		
3.4.1	HILL AFB, DRY PAINT STRIPPING	1.0	1.0	1.0	1.0	1.0	10.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	9.5	19.5
4.4.3	PENSACOLA NARF, SPRAY RINSE	1.0	1.0	1.0	1.0	1.0	10.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	9.5	19.5
5.4.2	FORT LEWIS ARMY, VEHICLE WASHRACKS	1.0	1.0	1.0	0.5	1.0	9.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	9.5	18.5
3.4.6	ROBINS AFB, SOLVENT RECYCLE	1.0	1.0	1.0	1.0	1.0	10.0	0.5	0.5	1.0	0.5	1.0	1.0	1.0	1.0	0.5	1.0	8.0	18.0
3.4.2	PENSACOLA NARF, DRY PAINT STRIPPING	0.7	1.0	1.0	1.0	1.0	9.4	1.0	1.0	1.0	1.0	0.5	0.5	1.0	0.5	1.0	1.0	8.5	17.9
5.4.1	FORT POLK ARMY, VEHICLE WASHRACKS	0.7	1.0	1.0	0.5	1.0	8.4	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	9.0	17.4
3.4.7	NORFOLK NSY, SOLVENT RECYCLE	1.0	0.5	1.0	1.0	1.0	9.0	0.5	0.5	1.0	0.0	1.0	1.0	1.0	1.0	0.5	1.0	7.5	16.5
4.4.5	ANNISTON ARMY DEPOT, PLATING	0.7	1.0	0.7	1.0	1.0	8.8	0.5	0.5	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	7.0	15.8
3.4.3	PENSACOLA NARF, WATER PRIMER	1.0	0.5	0.7	1.0	1.0	8.4	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	7.0	15.4
3.4.5	HUGHES (USAF), POWDER COATING	1.0	0.5	0.5	1.0	1.0	8.0	1.0	1.0	1.0	0.0	0.5	0.5	0.5	1.0	0.5	1.0	7.0	15.0
4.4.2	LOCKHEED (USAF), Cd PLATING	1.0	0.5	0.7	1.0	1.0	8.4	0.5	0.5	0.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	6.5	14.9
3.4.10	ANNISTON ARMY DEPOT, SOLVENT RECYCLE	1.0	0.5	0.7	1.0	1.0	8.4	0.0	0.5	1.0	0.0	1.0	1.0	1.0	0.5	0.5	0.5	6.0	14.4
3.4.4	LOCKHEED(USAF), PAINTING	0.7	0.3	1.0	1.0	1.0	8.0	0.5	0.5	1.0	0.0	0.5	0.5	1.0	0.5	0.5	1.0	6.0	14.0
3.4.8	TYNDALL AFB, SOLVENT RECYCLE	0.7	1.0	1.0	1.0	1.0	9.4	0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5	0.5	0.0	4.0	13.4
4.4.6	TOBYHANNA ARMY DEPOT, WASTE TREATMENT	1.0	0.5	0.7	1.0	1.0	8.4	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	3.5	11.9
3.4.9	NORFOLK NARF, HEPTANE RECYCLE	1.0	0.7	0.7	1.0	1.0	8.8	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.5	0.5	0.0	2.5	11.3
4.4.1	NORTH ISLAND NARF, IVD OF ALUMINUM	1.0	0.7	0.7	1.0	0.7	8.2	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	1.0	2.5	10.7
4.4.4	CHARLESTON NSY, LICON CHROME RECOVERY	1.0	0.5	0.7	1.0	0.7	7.8	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.5	10.3

NOTE: Each modification was assigned a score for each of fifteen criteria. The criteria applied and the scores possible for each criterion are shown below. Five of the criteria are to determine the example value of the case, or potential for reducing hazardous waste, if successfully applied. Double the sum of these values is used to compute the "Study Score." The second ten criteria were used to evaluate the success of the modification and potential for successful application at other DOD facilities.

STUDY VALUE		WEIGHTING VALUE	
A	CONCRETE EXAMPLE	1.0	0.5
B	WASTE REDUCTION	YES	QUESTIONABLE
C	WASTE GENERATION	MAJOR	MODERATE
D	EPA HAZWASTE	MAJOR	MODERATE
E	POTENTIAL USE	YES	SOMETIMES
		WIDESPREAD	LIMITED
	APPLICATION SUCCESS		UNIQUE
F	ENERGY USE		
G	MANPOWER	LOWER	SAME
H	MATERIAL COSTS	LOWER	SAME
I	CAPITAL COSTS	LOWER	SAME
J	MAINTAINABILITY	EASY	SAME
K	RELIABILITY	HIGH	MODERATE
L	SIMPLICITY	SIMPLE	MODERATE
M	STAFF ENTHUSIASM	CHAMPION	MODERATE
N	MANAGEMENT	SUPPORTIVE	MODERATE
O	PRODUCT IMPACT	FAVORABLE	NONE
			HIGHER
			HIGHER
			HIGHER
			HIGHER
			HARD
			LOW
			COMPLEX
			INDIFFERENT
			INDIFFERENT
			NEGATIVE

Source: CH2M HILL, July 1985.

1.4.3 Phase 3: 3 Projects of Excellence

As a result of all the evaluations the following three case studies were selected as the most appropriate to fulfill the overall goals of this project:

- 1. Plastic Media Paint Stripping at Hill Air Force Base, Ogden, Utah.**
- 2. Innovative Hard Chrome Plating at Pensacola Naval Air Rework Facility, Pensacola, Florida.**
- 3. Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities at Fort Lewis, Washington.**

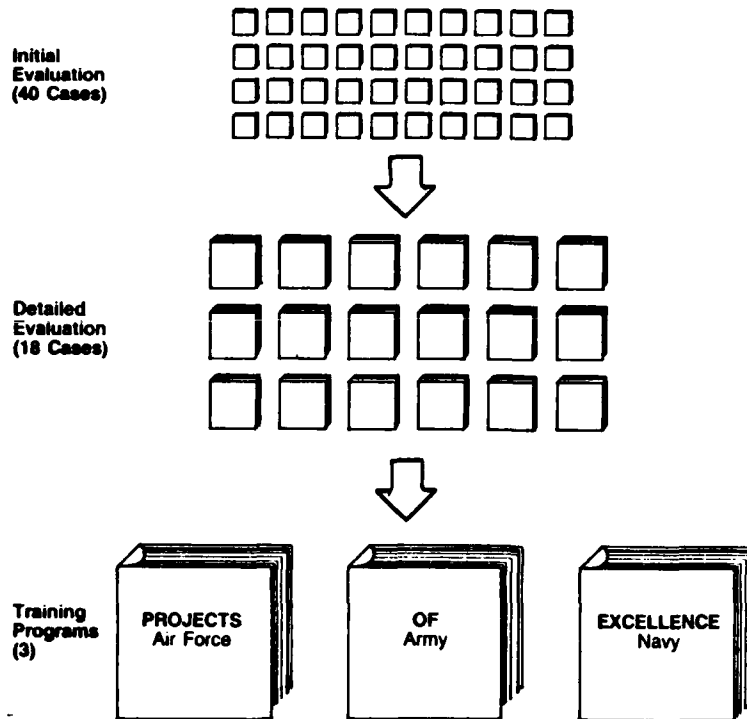
Plastic media paint stripping at Hill Air Force Base was selected for the following reasons:

1. Widespread DoD adoption has the potential of reducing the costs of operation by at least \$100,000,000 per year, a significant internal incentive to production and management people to implement this change.
2. Adoption of the process would eliminate one of the major liquid hazardous waste sources in the armed services.
3. Its applicability is widespread, potentially applicable at every military installation.
4. The process is easy to operate and involves adaptation of conventional technology.
5. From a production standpoint, manpower requirements are significantly reduced, product quality is improved, and production costs are significantly decreased.

The zero discharge chromium plating system, developed at Pensacola NARF by the Naval Civil Engineering Laboratory (NCEL) at Port Hueneme, likewise combines the incentives of production improvement with reduced hazardous waste production. The process is also widely applicable. From a production standpoint, rejection rates are drastically reduced, plating rates are increased, and fewer plating baths are required to plate the same number of parts. In addition, frequency of plating bath dumps has been reduced and industrial wastewater treatment has been simplified.

INDUSTRIAL PROCESSES

To Reduce Generation of Hazardous Wastes At DOD Facilities



Case Distribution

Category	Phase 1 (40)	Phase 2 (18)	POE (3)
Paint Stripping	4	2	1
Solvent Cleaning	10	7	1
Plating	13	6	1
Painting	5	3	—
	32	18	3

Technology Elegant in Its Simplicity

- Plastic Media Paint Stripping
- Solvent Recovery Stills
- Vehicle Wash & Maintenance
- Spray Rinse System

The central vehicle washracks and vehicle maintenance facilities at Fort Lewis, Washington, were selected principally for their segregation of exterior vehicle washing from vehicle maintenance and engine compartment cleaning. Conventional cleaning with cold water, solvents, and detergents on open pads resulted in a significant contamination of stormwater. The modification uses off-the-shelf high pressure hot water cleaning equipment for engine compartment cleaning, eliminating the use of solvents and greatly reducing the volume of waste requiring treatment. The overall system has also greatly reduced the manpower requirements for vehicle cleaning. Significant cost savings are projected compared to the previous operation.

During Phase 3, two-day workshops are being developed and given at each of the three sites. The workshops are designed for decision-makers in each of the three services, including managers, engineers, and operators who are responsible for similar military industrial processes at other facilities. The goal of the training programs is to give firsthand knowledge of highly successful process modifications and an understanding of why they have been successful, so that participants will be even better equipped to take the lead in adopting similar process modifications at their own facilities.

1.5 General Recommendations for Successful Process Modifications

Based on the case study analysis in Phases 1 and 2 of this report, the following recommendations were made for enhancing the likelihood of success for future process modifications:

1. Identify the potential advantages and disadvantages of including the costs of hazardous waste disposal in production budgets so that they will be used in production decisions.
2. Investigate the possibility of providing incentives for hazardous waste reduction efforts (e.g., returning money not spent on disposal to the base recreation and welfare fund).

3. Include production people in the design effort; since they will be left to operate the modified process, they need to feel that it is theirs.

4. Ensure that environmental effects are considered as important as production when conflicts between the two arise. It may be desirable to make environmental rating one of the evaluation criteria for the base commander.

5. Ensure that adequate funding is provided to support wider adoption of proven process modifications.

6. Ensure that appropriate adaptations are made to all technologies (even off-the-shelf systems) before transferring them to facilities where they have not been tested; thus, each technology will be "tailored" to the individual facility.

7. In view of the typically high turnover rate among operations personnel, ensure that a sufficient number of personnel are trained to provide back-up operation when necessary.

8. Ensure that the data collected to predict costs and benefits of a particular technology are accurate, valid, and sufficient.

9. Ensure that design personnel devote sufficient time, after equipment installation, to inspecting the system for proper operation and maintenance.

10. In considering locations for future demonstration studies, select only facilities where the responsible personnel are enthusiastic about the study.

11. In conducting future demonstration studies, ensure that sufficient manpower is assigned and that the personnel are adequately trained, well supervised, and not fully committed to other projects.

12. Whenever possible, make adaptations to off-the-shelf equipment with a proven record of reliability rather than selecting specialized or complicated equipment.

Again, welcome to Fort Lewis for the Project of Excellence Workshop on Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities. The remaining sections of these workshop materials discuss numerous technical, environmental, and economic aspects of this highly successful project to reduce hazardous waste generation from vehicle cleaning and maintenance operations at DoD facilities.

Presented by Richard Boubel, Project Officer, DELP



DEFENSE ENVIRONMENTAL LEADERSHIP PROJECT

INAUGURATED JANUARY 1984

REPORTS TO THE DIRECTOR OF ENVIRONMENTAL POLICY, OASD

PURPOSE

- o TO IMPROVE COMPLIANCE**
- o TO REDUCE WASTE**

PRESS RELEASE

DEFENSE ENVIRONMENTAL LEADERSHIP PROJECT

Environmental protection is a multi-billion dollar DoD effort. Non-compliance with environmental laws and regulations will adversely impact DoD operations, resources and Congressional support. DoD is the largest federal generator of hazardous wastes, and the public, news media and Congress view environmental protection from hazardous wastes as a high national priority. Environmental protection cannot be avoided or ignored. The nuclear power industry, for example, used the best engineering, planning and economic talent available. The one area overlooked, environmental protection, ultimately crippled the industry.

The environmental leadership project was initiated to provide DoD a needed resource for long-range planning and policy development. The project has undertaken 18 tasks which can be grouped broadly under "compliance" and "waste stream reduction". Compliance is necessary to avoid crippling our installations and production base, and waste stream reduction will reduce disposal costs and future disposal-related problems.

The leadership project approach of planning to avoid problems will ensure least cost compliance. Resources not required for environmental protection are freed for other Defense programs. Effective planning and management are used to identify and solve problems before they become more costly. Environmental protection need not be complex and costly, if handled properly.

The project team is dealing with some tough environmental issues -- problems like groundwater protection, solvent recovery, regional hazardous waste treatment, hazardous waste storage construction criteria, environmental audits, and low-level radioactive waste disposal. These and future issues will improve significantly DoD's national leadership position in environmental protection and avoid the pitfall of non-compliance.

**INDUSTRIAL PROCESS MODIFICATION TO
REDUCE HAZARDOUS WASTE GENERATION**

- o PHASE I - STUDY OF EXISTING INFORMATION
- o PHASE II - IN-DEPTH ANALYSIS OF A FEW DOD INDUSTRIAL PROCESSES
- o PHASE III - SELECT ONE PROCESS FROM EACH SERVICE AS A DEMONSTRATION PROJECT OF EXCELLENCE

**DOD NEEDS AN INCENTIVES PROGRAM FOR HAZARDOUS WASTE
REDUCTION/RECYCLING**

- o TO PROVIDE UP-FRONT MONEY FOR WASTE REDUCTION PROJECTS.
- o TO RETURN BENEFITS TO THE INSTALLATION COMMANDER.

**FUNCTIONAL DESCRIPTION OF THE ENVIRONMENTAL, PRODUCTIVITY
ENHANCING CAPITAL INVESTMENT (PECI) PROGRAM**



THE DEPARTMENT OF DEFENSE

**PRODUCTIVITY ENHANCING
CAPITAL INVESTMENTS
PROGRAM STATUS REPORT**

**PREPARED BY
THE DEFENSE PRODUCTIVITY PROGRAM OFFICE
FOR THE
ASSISTANT SECRETARY OF DEFENSE
FOR
MANPOWER, INSTALLATIONS AND LOGISTICS**

MARCH 1984

EXECUTIVE SUMMARY

The Department of Defense (DoD) is pleased to report, once again, on the status and achievements of the DoD Productivity Enhancing Capital Investment (PECI) Program. In addition to providing specific information on this program, this report will describe the relationship of the Peci Program to many other DoD productivity initiatives, ranging from established programs for employing modern industrial and management engineering techniques to the Department's relatively new emphasis on work force motivation and efficiency reviews.

The Department is very proud of its efforts. Since the initiation of the Peci Program in 1977, a broad range of avenues for productivity improvement have been investigated and pursued. Many have become institutionalized in DoD management practices. Others are promoted as "self-help" tools whereby managers can cope with the demands of increasing technology and constrained or diminished resources. The Department recognizes that if it is to be effective in maintaining a strong and ready Defense force, it has a commensurate responsibility to do this in the most efficient manner -- a process which means getting the greatest return from the dollar and manpower resources provided by the American taxpayer. DoD's Peci Program is a very necessary effort to this end with a demonstrable impact.

Initially started as a means of capitalizing on small dollar quick return investment opportunities, the Peci Program has since evolved into a broad strategy for productivity improvement. As presently structured, it involves three distinct but directly related funding strategies -- the Productivity Enhancing Incentive Fund (PEIF) for small dollar quick return equipment projects; the Productivity Investment Fund (PIF) which focuses on larger long-term investments with a payback period of four years or less; and Component Sponsored Investment (CSI) funding which complements the OSD-sponsored PIF but is more flexible to react to goals and priorities of the individual Military Service or Defense Agency. Projects financed through each of these funds are selected competitively on the basis of their economic merit and an assessment of their technical and operational potential.

Together these three funding strategies have invested a total of \$605 million over the past four years to acquire modern technologies and facilities. The savings from these investments are expected to total over \$3.0 billion by 1990, through either direct reductions in Defense budget requests or by allowing DoD managers to plow back savings and thereby accomplish increased missions or attack critical backlogs within fixed resource limitations. Equally as important, these Peci funds have become a cornerstone in many of the Department's other productivity initiatives by

providing ready and dedicated financing for opportunities identified through the Commercial Activities, Efficiency Review and Work Force Motivation Program. PECIs have also served as an avenue to foster infusion of high technology projects into the Defense operational mainstream. Funds have been provided for such wide-ranging projects as DoD's Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) project involving the use of machine readable bar coding in logistics activities and the installation of technologies developed through the Manufacturing Technology Program in the repair of sophisticated weapons systems. Modern equipment has also been procured for the Defense laboratories, enabling them to greatly improve the testing of new materials and systems at significantly lower costs.

Statistics on the PEI Program are impressive. Visible support by top DoD management, a sharp focus on high-payoff investments, and an ultra-conservative level of funding have resulted in a continuing increase in the expected level of returns from PECIs. Savings to investment ratios for the fast payback PEI investments have grown from approximately \$10 to \$1 for Fiscal Year (FY) 1977 investments to \$13 to \$1 for FY 1983 investments. Many of the individual investment projects return about \$15 for each dollar invested during their average nine year life span. The larger PEI investments, because of their longer expected life, have shown a much greater growth in expected savings. First funded in 1981, the savings to investment ratios have dramatically increased from 6 to 1 in that year to 14 to 1 for projects included in the FY 1984 Budget request. Projects now in the FY 1985 Budget reflect a ratio of 22 to 1, with an expected internal rate of return of over 80 percent.

In addition to the tangible benefits from PECIs, which include expected manpower savings of over 17,500 spaces, these investments have also produced a variety of intangible benefits such as improved work methods and conditions, increased ability to cope with complex and mounting workloads, and motivation for innovative productivity enhancing actions.

The program complements DoD's Asset Capitalization Program (ACP) in industrially funded activities and planned modernization efforts across the Department. More importantly, it recognizes and acknowledges the fact that the Department's greatest asset is the initiative shown by its people. PEI has received the full support of Defense management at all levels. With its present maturity, it is deserving of the support of the Congress for it represents concrete evidence of DoD's ability to achieve tangible economies through a judicious investment policy.

Contact: Mr. Richard J. Power, Director
Defense Productivity Program Office
2 Skyline Place, Room 1404
5203 Leesburg Pike
Falls Church, Virginia 22041-3466
Phone: (703) 756-2346

2.0 PROJECT DESCRIPTION

2.1 Process Description

2.2 Magnitude of the Problem

2.3 Technologies Available to Reduce Hazardous Wastes from Washrack Operations

2.4 Vehicle Washrack Case Studies:

2.4.1 Fort Polk, Louisiana

2.4.2 Fort Lewis, Washington

2.5 Washrack Recommendations

2.0 PROJECT DESCRIPTION

2.1 Process Description

Vehicle washing is an important daily Army activity. All tracked and wheeled vehicles must be kept clean to increase the useful life of the equipment and allow proper inspection and maintenance. During field operations, vehicles can accumulate significant amounts of exterior and interior soil. For example, in certain areas of the country, tanks can accumulate up to one ton of exterior soil during a normal field maneuver. Interior soiling also occurs which can affect the accuracy of the sensitive instruments contained in the vehicle. In order to provide proper maintenance, interior and exterior cleaning must be performed.

Cleaning to remove exterior soil from both tracked and wheeled vehicles is typically conducted at the end of training exercises, after road testing a serviced vehicle, and before inspections. Except for fuel transport vehicles, the cargo areas of vehicles are cleaned during exterior cleaning as well. Exterior cleaning is accomplished using a number of methods which include "bird baths" (large vehicle-sized bath tubs) and manual or automatic spray booths. The method selected for cleaning is dependent on the types of soil encountered during field activities, the amount of soil collected during these activities, and the amount of energy needed to remove the soils.

Interior vehicle cleaning often requires a different technique than is used for exterior cleaning because of the sensitive, sophisticated electronic, mechanical, and optical equipment housed in the vehicle (U.S. Army Corps of Engineers, Undated).

Maintenance cleaning is performed on virtually all Army vehicles. Engine compartments are routinely cleaned before scheduled maintenance, unscheduled repairs, daily maintenance, and regular inspections. The Construction Engineering Research Laboratory (CERL) of the U.S. Army Corps of Engineers (USACOE) has reported that maintenance cleaning is conducted at approximately 3,000 maintenance shops and 2,000 washracks in the continental United States and overseas (U.S. Army, CERL, November 1982). Maintenance cleaning is conducted to remove large amounts of oil, grease, and dirt from major mechanical and protective components including engines, hydraulic equipment, and transmissions.

Scheduled maintenance is primarily preventive in nature. It involves cleaning and inspecting vehicle components, greasing, oiling, changing lubricant, cleaning and replacing

filters, and testing. Scheduled maintenance is the major activity within a motor pool area. Engine cleaning and petroleum, oil, and lubricant (POL) transfer are the major sources of pollution during scheduled maintenance cleaning.

Unscheduled maintenance is conducted primarily to correct acute or chronic vehicle component failures. Daily maintenance is primarily preventive, involving activities such as inspecting belt tensions and checking fluid levels.

2.2 Magnitude of the Problem

At most Army bases, cleaning and maintenance activities are combined in the same area (e.g., vehicle washrack, vehicle grease rack, or the hardstand area). As a result, the entire area becomes a source of pollution. These equipment maintenance facilities are designed such that all wet maintenance operations (e.g., oil changing and equipment cleaning) are performed in surroundings which make effective pollution control difficult and expensive (U.S. Army, CERL, August 1981). In many cases, newly designed facilities are a reflection of old facility designs which do not include new and used oil transfer and storage or proper wastewater treatment facilities.

Sources of wastewater from maintenance operations include the following:

1. Vehicle and equipment cleaning
2. Heavy maintenance cleaning (engine and engine compartment cleaning)
3. Oil changing and lubricant application
4. Improper handling and storage of new and used POL
5. Small parts cleaning
6. Radiator flushing
7. Vehicle and equipment parking

The quantity of wastewater generated at each facility will vary; however, those facilities having a greater number of vehicles are expected to generate a greater amount of wastewater.

Exterior and interior vehicle cleaning activities generally result in wastewater which contains primarily soil, water, and small quantities of oil (unless solvents or other cleaners are used). This wastewater is manageable by itself; however, when combined with wastes generated from maintenance cleaning activities, wastewater treatment and disposal problems become significantly magnified.

At older facilities, high volume, low pressure cold water cleaning systems are typically used for maintenance cleaning. Because this type of system is ineffective in

removing most oily materials, solvents, detergents, and other cleaners are often used in combination with the water.

This method of cleaning results in a complex wastewater which is difficult and expensive to treat. Wastewater treatment at these facilities generally consists of a gravity oil separator which is ineffective in removing emulsified oil and solvent contaminants. The wastewater generated at the combined facilities can result in NPDES permit violations if discharged directly to a receiving stream or operational problems if discharged directly to the installation's wastewater treatment plant.

Since these activities are often conducted at the washrack or hardstand area, the amount of wastewater (including stormwater) generated is large. Installation of a pretreatment system would be impractical unless the existing maintenance area can be modified to reduce the amount of wastewater generated.

Water used for vehicle cleaning represents a major percentage of the total water used at most installations. In many locations (e.g., the desert Southwest), water supplies are limited, sometimes severely. Methods for reducing the amount of water needed for vehicle cleaning and alternatives for reuse are necessary.

In several cases, new central vehicle wash facilities (CVWF) have been constructed which do not work properly (e.g., Ft. Riley, Ft. Carson, and Ft. Knox). Due to the soiling conditions present in the area, the wash facilities constructed could not adequately clean the vehicles. Automatic spray systems were provided for primary cleaning in places where bird bath facilities were required. Spray booths were provided for wheeled vehicles but did not work due to electronic equipment malfunctions and the odd shapes and sizes of some of the wheeled vehicles. Both the water pressure and volume provided to clean the vehicles were inadequate.

Filling and draining of cleaning facilities could not be accomplished in a reasonable length of time due to improperly sized pumping equipment. Ingress to and egress from the primary cleaning facilities (drive-through baths) were difficult, if not impossible. Vehicle cleaning times were excessive and resulted in inadequate cleaning. Oil/water and grit separation facilities were not designed to allow proper cleaning, and industrial wastewater was used for washwater makeup without proper removal of contaminants. Front-end loaders could not enter and exit the separator to remove grit.

Figures 2-1 and 2-2 show a typical tracked vehicle.



Figure 2-1. Tracked vehicle during field maneuvers.

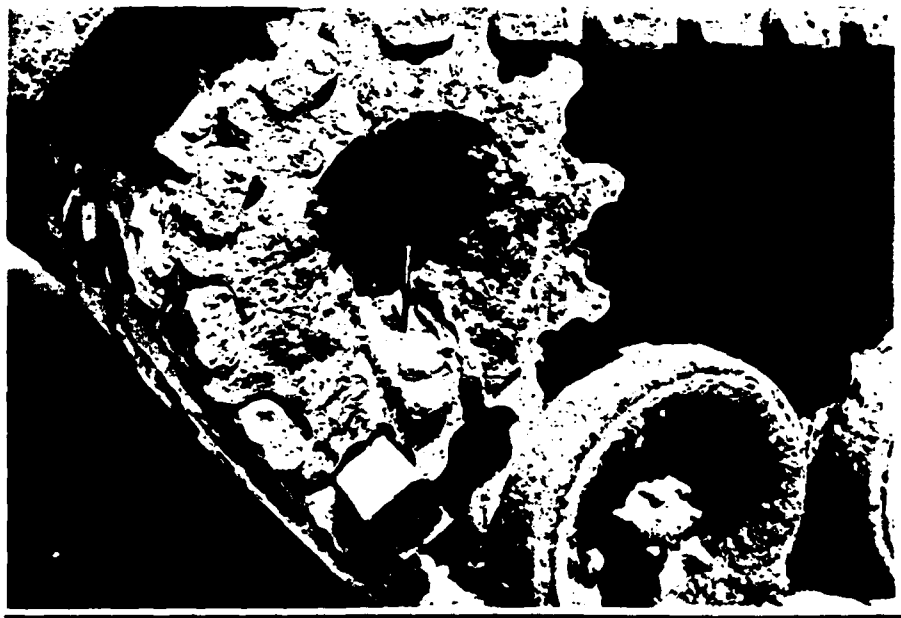


Figure 2-2. Tracked vehicles can accumulate up to a ton of soil during field activity.

2.3 Technologies Available to Reduce Hazardous Wastes from Washrack Operations

The ultimate purpose of vehicle washing and maintenance facilities is to provide an environment to Army personnel which is conducive to proper vehicle cleaning and maintenance. Because soiling conditions and equipment requirements vary from facility to facility, there is no single "correct" design or layout. However, there are some general modifications which could be applied to reduce the generation of wastewater containing hazardous contaminants.

The modification showing the most promise for significant results is to physically separate vehicle washing facilities from maintenance cleaning facilities. This modification segregates the two types of wastewaters generated, which are significantly different in character and treatment requirements. Separating the washing operations from the maintenance operations results in the following advantages:

1. Wastewater at both locations that can be easily treated using conventional methods
2. Increased waste oil collection
3. Decreased solvent and detergent usage
4. Improved maintenance and exterior cleaning efficiency
5. Lower water usage for vehicle washing due to direct water reuse
6. Reduced operation and maintenance (O&M) cost, since stormwater treatment is not required
7. Fewer troop manhours for cleaning

Existing vehicle washracks could be abandoned and replaced with one or two CVWFs per Army base. The facilities should be designed to reduce stormwater flow from the area. CVWFs also require that only one or two wastewater treatment systems be built instead of many. In short, CVWFs centralize wastewater treatment, reduce the quantity of wastewater generated, generate a wastewater treatable by conventional methods, increase the chances of spotting maintenance problems, and reduce capital and O&M costs. New modern facilities can also help induce military personnel to make proper use of the facility.

New CVWFs should include the following features:

1. Separate wash facilities for tracked and wheeled equipment
2. Improved washing equipment for tracked and wheeled vehicles
3. Effective wastewater treatment systems which allow either direct discharge to a surface-water body or direct recycle (e.g., settling, flow equalization, intermittent sand filtration, filtered effluent storage) (U.S. Army, CERL, July 1977)
4. Proper cleaning facilities and equipment for the types of soiling conditions expected (e.g., no "bird bath" facilities in areas where light soiling conditions exist)

Initiating these modifications can significantly reduce the quantity of wastewater generated while still allowing vehicles to be cleaned in an acceptable amount of time. The resulting wastewater can be treated using conventional methods to meet the discharge standards presented in Table 2-1. This method of treatment also allows treated water to be recycled back to the wash facility.

Table 2-1
EFFLUENT QUALITY CRITERIA
(U.S. Army, CERL, August 1981)

<u>Parameter</u>	<u>Concentration</u>
Total Suspended Solids (mg/L)	300 maximum 200 average
Total Oil and Grease (mg/L)	100 maximum 50 average
pH (units)	6-9
BOD ₅ (mg/L)	400 maximum 300 average

Note: Effluent shall not contain any visible sheen; effluent shall be compatible with and not interfere with an installation's domestic wastewater treatment processes.

Historically, maintenance facilities have been on or adjacent to the hardstand and washrack areas. Because of the large surface area involved and widespread pollution,

contaminated stormwater treatment has become a major challenge. Scheduled maintenance activities, therefore, should be conducted in either retrofit facilities (upgraded existing motor pool areas) or new maintenance facilities. The upgraded or new facilities should be designed for high maintenance efficiency, pollution control, and spill containment. To prevent stormwater problems, the service area should be elevated. In addition, the service area should be divided into a dry oil changing area and a wet maintenance cleaning area. Waste oil can then be collected in the oil changing area and stored for separate recycling or disposal.

In the maintenance cleaning area, the engine packs can be cleaned. Hot water cleaning equipment, instead of steam or cold water with solvents, detergents, and other cleaners, can be used for maintenance cleaning. High pressure, low volume hot water cleaning without chemicals has been found to be more effective than cold water cleaning or steam cleaning in combination with chemical cleaners; in addition, it generates a smaller volume of wastewater, which can be treated using conventional treatment technologies. The recommended operating criteria for hot water cleaning equipment include 800 pounds per square inch (psi) operating pressure, 130°F operating temperature, and a 25 degree nozzle-spray pattern with a flow rate of 3.5 gpm (U.S. Army, CERL, August 1981).

Figures 2-3 and 2-4 show portions of an M-60 tank before and during cleaning operations.

2.4 Vehicle Washrack Case Studies

2.4.1 Vehicle Washrack at Ft. Polk, Louisiana

Ft. Polk Army Base in Leesville, Louisiana, constructed two new CVWFs in 1982. The base has recently completed construction of four new scheduled maintenance facilities and 12 more are under construction.

Prior to construction of the new CVWFs, individual washracks with potable water were heavily used for cleaning. The production rate at the existing washracks was 3.5 hours for 12 people to clean 6 tracked vehicles. Due to the high concentration of solvents, sediment, and oil in the wastewater from the washracks and the turbulence created during the cleaning operation, an emulsified, frothy waste, referred to at Ft. Polk as "chocolate mousse," was formed and required proper disposal. This frothy waste was not a defined hazardous waste according to standard testing (e.g., ignitability, reactivity, corrosivity, and EP toxicity); however, some solvent contamination was present. The frothy waste contained 20 to 75 percent water, which made solvent recovery economically infeasible. Commercial disposal of

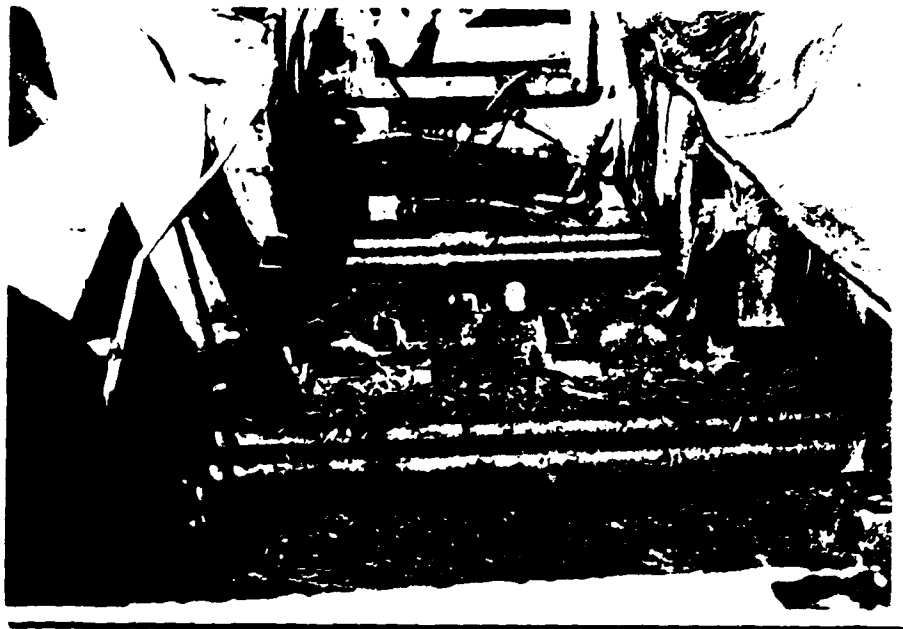


Figure 2-3. Oily engine compartment of an M-60 tank.



Figure 2-4. Conventional open area solvent and detergent cleaning of M-60 tank engine pack.

this waste product was estimated to be \$0.80 per gallon F.O.B. the disposal site. Approximately 15,000 cubic feet of the frothy waste were generated annually. This resulted in a disposal cost of \$84,000 per year (15,000 cf/y x 7 gallon/cf x \$0.80/gallon = \$84,000/year) plus transportation costs.

The new CVWFs each have three lanes and were designed specifically for exterior cleaning of tracked vehicles. These facilities use nonpotable water as a water source. The production rate for these new facilities is one hour for 12 people to clean 25 tracked vehicles. Six steps are required to initiate the process and one to terminate it. A 5-minute safety briefing is provided daily for each wash customer.

Large washing basins, referred to as "bird baths," were installed as part of the CVWF to help remove heavy soil which accumulates within the tracks and on the underside of the vehicles. The bird bath is filled with water and the vehicles drive through for the primary washing action.

Twenty-inch diameter pipes have been filled with concrete and partially submerged in the bottom of the basin. Two rows of staggered pipes have been installed for each lane, causing a teetering action when a tank or other tracked vehicle drives through the bird bath. The tracks move through their entire range of motion as they proceed over the corrugations on the bottom of the bird bath, dislodging any caked-on soil.

Water monitors (spray cannons) deliver water at 360 gpm and 40 psig pressure at the vehicles above the water level in the bird bath to provide secondary cleaning.

Washrack facilities with hoses are provided to clean the inside of vehicles after they exit the bird bath. One lane at each CVWF has been modified by inserting concrete parking curbs between corrugations to enable use by wheeled vehicles.

Waste washwater is discharged to a sedimentation lagoon for suspended solids removal and reuse. No oil sheen has appeared on the basin in 3 years of operation. On an annual basis, evaporation from the lagoon is approximately equal to the precipitation plus stormwater runoff, which recharges the lagoon. Consequently, little makeup water is required.

It is estimated that the approximately 20,00-30,000 cubic yards of sediment produced each year will be removed by dredging every 4 to 5 years. The sediments have been tested for heavy metals and EP toxicity and are not defined as being hazardous. The ponds have been stocked with fish, on which bioassays will be performed in the future.

Even though operation is continual, Ft. Polk has had few problems with their wash and recycle system during 3 years of operation. The CVWF has operated 24 hours per day 7 days per week for 3 years with no disruptions. Compared to previous vehicle washracks, the new wash facilities result in cleaner vehicles, allowing for improved operator maintenance and better maintenance inspection. The only maintenance problem noted was with the four buried butterfly valves used to control discharge into the bird baths. Higher quality water monitors would be preferred over the existing monitors to prevent erosion of seals and other components. One unanticipated problem was theft of the brass water monitor nozzles, presumably for their pawn shop value.

The research cost for designing the wash facilities at Ft. Polk was \$263,000. Costs for facility construction, energy, wastewater treatment/reuse facilities, and new trails to and from the facility amounted to \$4,994,000 (1982 dollars) (U.S. Army, CERL, February 1985).

Figures 2-5 through 2-8 show details of Ft. Polk wash facilities.

Until all of the new scheduled maintenance facilities are completed, servicing will continue as required at the individual washracks. Some solvent and oil control benefits have already been realized by removing the exterior wash function from the old washracks. The hazardous waste solvents and oil generated at the washracks are now recyclable and sold through DPDO for \$0.39 per gallon. The goal is to eventually reuse the material as a boiler fuel, replacing current fuel which costs over \$1.00 per gallon. Ft. Polk is collecting approximately 18,000 gallons of waste oils and solvents per year, which is expected to result in an annual savings of \$7,020.

Construction of the new CVWFs at Ft. Polk has resulted in the following significant benefits:

1. Annual labor requirements for vehicle cleaning have been reduced by 194.5 man-years.
2. Frothy waste disposal costs of \$84,000 per year have been reduced to essentially zero.
3. Oil- and solvent-containing wastes are now being recovered and sold to a recycler for \$0.39/gallon at an annual savings of \$7,000.
4. Approximately one-third as much water is needed for cleaning each vehicle.



Figure 2-5. Conventional vehicle wash facility at Fort Polk.



Figure 2-6. New "Bird Bath" central vehicle wash facility at Fort Polk.

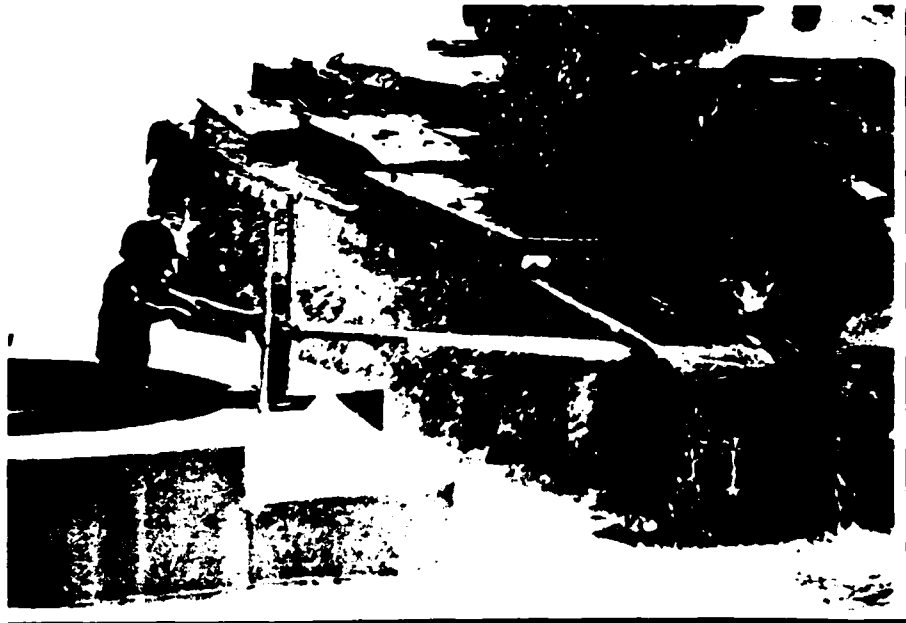


Figure 2-7. Water monitor helps to clean tank exterior at Fort Polk.

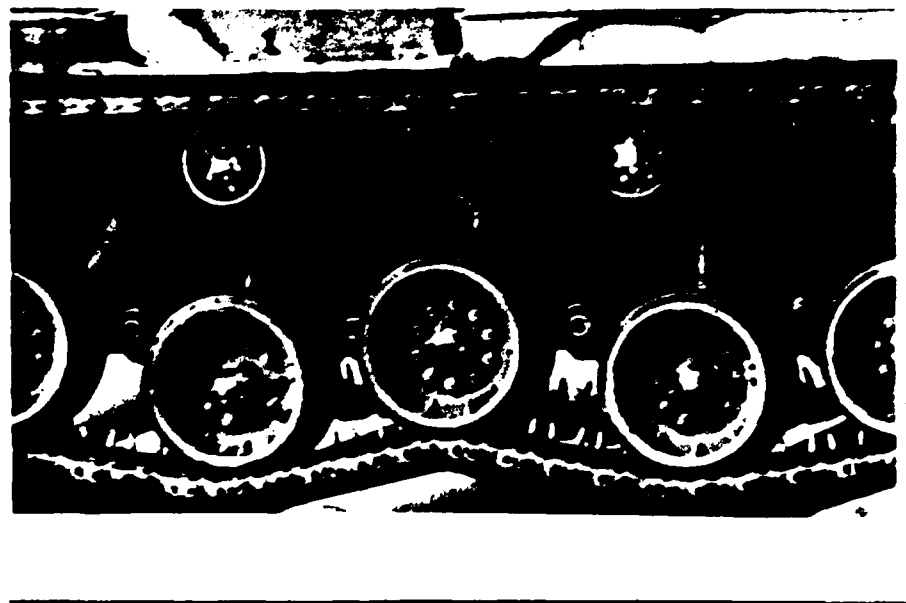


Figure 2-8. Staggered pipes for flexing treads (normally submerged) causes most of tread cleaning.

5. The water used for vehicle cleaning is recycled. Annual evaporation approximately equals precipitation plus stormwater runoff; therefore, little make-up water is required.
6. Since solvents and cleaners are no longer used, expensive pretreatment facilities are not needed.
7. O&M costs for central vehicle wash facilities are approximately 50 percent less than the corresponding costs for the older vehicle washracks.
8. Cleaner vehicles are produced by the new wash facilities, allowing better maintenance inspection and thus shorter service time.
9. Lower volumes of wastewater are generated which require smaller oil/water separation pretreatment facilities.
10. Hot high pressure water eliminates the need for solvents and cleaners.

The benefits for Ft. Polk as a result of the new combined vehicle wash facilities were estimated by the U.S. Army Construction Engineering Research Laboratory to be \$10.4 million per year (U.S. Army, CERL, February 1985).

2.4.2 Vehicle Washrack at Ft. Lewis, Washington

Ft. Lewis, located near Tacoma, Washington, is the only Army installation which has implemented both CVWFs and scheduled maintenance facilities. There are three wash facilities at Ft. Lewis and one at the Yakima firing range, which is under Ft. Lewis supervision. There are 44 scheduled maintenance facilities at the base.

Ft. Lewis does not have bird baths. Because the Washington soils are lighter than Louisiana soils, the bird bath type of operation is not required for good cleaning. Ft. Lewis has installed a series of new washracks in each of the central facilities which consist of an overhead boom and hose to supply water at 30 gpm and a pressure of 90 psig. Each CVWF has separate lanes for tracks and wheeled vehicles.

Waste washwater is collected in a drain, then treated prior to recycling. Treatment processes include API oil/water separation, equalization, and intermittent sand filtration. The reclaimed washwater is pumped from the detention basin for reuse. The north Ft. Lewis facility does not recycle water, but instead discharges it directly to the sanitary sewer.

Two commercial vehicle wash facilities have been installed in conjunction with the central wash facilities. One services primarily cars and has operated well. The other serves irregularly shaped wheeled vehicles and has had numerous operating and maintenance problems.

With the lower pressure water in the old system, tracked vehicles required approximately 2 hours for proper cleaning. With the new high pressure system, a tracked vehicle can be washed in approximately 20 to 30 minutes and wheeled vehicle in 15 to 20 minutes.

The scheduled maintenance facilities are designed for the type and number of vehicles serviced presently. High pressure hot water is supplied for cleaning, thereby eliminating the need for solvents and detergents. Steam was used for cleaning purposes at the older washrack, resulting in maintenance and safety problems. However, the problems associated with the high temperatures of the steam have mostly been eliminated with the hot water system.

Figures 2-9 through 2-12 show washing and maintenance facilities at Fort Lewis.

Wastewater from combined washing and servicing operations had previously been discharged to the storm sewer. The waste contained large amounts of oil and solvents, which led to numerous violations of the discharge permits. In addition to separating exterior washing from service washing, oil separators have been installed on the storm drain discharges. The combination of reduced solvent use, better control of waste oil, and installation of oil/water separators has led to a 90 to 95 percent reduction in the contaminants being discharged to the surface water. Discharges are now regularly meeting NPDES discharge limitations.

The research and development cost for designing central vehicle wash facilities for Ft. Lewis was \$263,000. The cost to construct the facilities was \$3,645,000 (1981 dollars). The research and development cost for designing maintenance facilities was \$296,000. The cost to construct the facilities was \$7,545,000 (1981 dollars) (U.S. Army, CERL, February 1985).

Construction of the new central vehicle wash and maintenance facilities has resulted in the following significant benefits:

1. Man-hours needed for cleaning track vehicles have been reduced by 85 percent.
2. Expensive pretreatment facilities required to treat a wastewater consisting of oil, solvents, sediment, and detergents became unnecessary. CERL estimates this savings to be approximately \$5 million.



Figure 2-9. Central vehicle wash stands at Fort Lewis. (Two sets of stands in background, intermittent sand filters and water storage ponds in foreground.).



Figure 2-10. Exterior wash stands at Fort Lewis.



Figure 2—11. Covered scheduled maintenance facility at Fort Lewis.



Figure 2—12. Hot water cleaning of engine pack at Fort Lewis.

3. High pressure hot water used for maintenance cleaning and supplied at 3.5 gpm has replaced low pressure cold water supplied at 30 gpm and high pressure steam. This has resulted in significant water savings and reduced maintenance requirements.
4. Since the total wastewater flow was reduced, smaller oil/water separation facilities were required. CERL estimates this to have resulted in a \$1.1 million savings in equipment alone.
5. Solvents, cleaners, and detergents are no longer required since high pressure hot water is used for maintenance cleaning and high pressure water is used for vehicle washing.
6. Oil recovery has increased from approximately 54,000 gallons per year to 90,000 gallons per year. This oil is sold to a recycler for \$0.30/gallon, resulting in an annual recovered cost of \$10,800.
7. Cleaner vehicles allow better maintenance inspection and thus shorter service time.
8. O&M costs for the new facilities are approximately 50 percent of the corresponding costs for the old facilities.

2.5 Washrack Recommendations

Table 2-2 summarizes the problems encountered at existing vehicle wash and maintenance facilities and provides the latest recommended methods for minimizing or overcoming these problem. Additional recommendations are given below.

1. When planning CVWFs, special attention should be paid to design considerations (e.g., type of soil to be removed, cleaning frequency, number of vehicles). The facilities should be designed accordingly. A new wash facility should not be designed around another facility's operation without thorough research (U.S. Army, CERL, May 1982).
2. USA-CERL should be consulted concerning proper design of a CVWF. Their design guides should be followed where applicable (U.S. Army, Corps of Engineers, 12 August 1985).
3. All vehicle maintenance (tracked and wheeled) should be conducted at a vehicle maintenance facility which is separate from the wash facility to allow for more efficient maintenance operations. Separation of facilities allows greater control over the type and quantity of wastes generated and their ultimate method of disposal (U.S. Army, CERL, August 1981).

Table 2-2
SUMMARY OF PROBLEMS AND RECOMMENDED SOLUTIONS
FOR DESIGN, CONSTRUCTION, AND OPERATION
OF CVWFs AND VEHICLE MAINTENANCE FACILITIES

Problem	Proposed Solution
1. Combined vehicle wash and maintenance facilities result in a large volume of wastewater which is difficult to treat collectively. Direct discharge results in NPDES permit violations, and discharge to treatment plants results in operational problems.	Separate the facilities.
2. Low pressure, cold water cleaning systems are inadequate. Solvents and other cleaners are required for proper cleaning. This results in a wastewater which is difficult and expensive to treat.	Replace existing water cleaning systems with high pressure low volume cleaning systems at the wash racks and high pressure, low volume, hot water cleaning systems at the maintenance facilities. Discontinue use of solvents and cleaners.
3. Water usage at existing vehicle washracks is high. In some areas, available water is limited.	Design the washing facilities to allow water reuse.
4. Contaminated stormwater results in a large volume of wastewater requiring treatment.	Design the systems to minimize stormwater contamination by diverting the stormwater away from the site.
5. Vehicle wash facilities have been designed and constructed which do not work adequately, so that vehicles are not properly cleaned and cleaning times are excessively long.	Design new facilities with site specific design requirements in mind. Refer to previously published design information. Consult with USA-CERL for further assistance.

4. Vehicle maintenance cleaning should be conducted with high pressure, low volume hot water cleaning equipment capable of meeting the service requirements without using solvents and/or other cleaning aids (U.S. Army, CERL, August 1981).
5. Oil/water separators should be used to remove suspended solids and free oils (hydraulic overflow rate ≤ 100 gpd/ft² and hydraulic detention time of 8 hours) for pretreatment of wastewater discharged from improved track vehicle maintenance facilities which have high pressure, low volume hot water wash equipment incorporated into their design (U.S. Army, CERL, August 1981).
6. Waste oil handling methods should be provided which minimize manual handling (U.S. Army, CERL, August 1981).

WDR111/031

3.0 STANDARDIZATION OF CRITERIA FOR TACTICAL VEHICLE WASH FACILITIES

- 3.1 DAEN-MPE-D Letter, 19 August 1982.
- 3.2 DAEN-ECE-G Message, 13 March 1984.
- 3.3 DAEN-ECE-G Message, 19 June 1984.
- 3.4 DAEN-ECE-G Message, 12 August 1985.

3.1 DAEN-MPE-D Letter, 19 August 1982



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-MPE-D

19 AUG 1982

SUBJECT: Standardization of Criteria for Tactical Vehicle Wash Facilities

SEE DISTRIBUTION

1. Criteria for vehicle wash facilities have been developed by the Construction Engineering Research Laboratory (CERL). These criteria have been reviewed, briefed to the MACOMs, and are now being issued as USACE standard criteria. Several projects have been built utilizing these criteria; and have proven to be highly effective and conserving of energy and water resources.

2. Appropriate Engineer Technical Letters (ETL's) are being prepared. In the interim, the inclosed criteria will be considered as the USACE standard approach for all projects, including those now under design. Projects in the early phase of construction will be examined to determine if they can be modified within reasonable cost and time considerations to bring them in alignment with these criteria. POC at this headquarters is Mr. W. Medding, AV 285-0414.

FOR THE COMMANDER:

1 Incl
as

Ames S. Alburo, Jr.
AMES S. ALBRO, JR.
Major General, USA
Director of Military Programs

19 AUG 1982

DAEN-MPE-D

SUBJECT: Standardization of Criteria for Tactical Vehicle Wash Facilities.

DISTRIBUTION:

COMMANDERS

Huntsville Division
Europe Division
Missouri River Division
North Atlantic Division
North Pacific Division
Ohio River Division
Pacific Ocean Division
South Atlantic Division
South Pacific Division
Southwestern Division
Alaska District
Baltimore District
Far East District
Fort Worth District
Japan District
Kansas City District
Los Angeles District
Louisville District
Mobile District
New York District
Norfolk District
Omaha District
Sacramento District
Savannah District
Seattle District
Tulsa District

DAEN-MPE-D

SUBJECT: Criteria for Vehicle Washracks

1. A detailed analysis has been made of vehicle washing operations and facilities in order to develop near-optimum criteria for standardization. These criteria are in preparation and will be furnished at an early date.
2. Current washrack practice includes many operations other than the exterior washing for which they were designed. These operations include cleaning of engine packs and compartments, and POL transfers. Because of low water pressures and cold water temperatures, the use of solvents and detergents has become normal practice and has resulted in the discharge of complex wastewaters, which cannot be adequately treated with gravity grit and POL separators. Many design practices for washracks and their wastewater treatment systems are proving inadequate in terms of vehicle processing rates and pollution control considerations. Connection of washrack discharges to installation storm sewer systems is no longer acceptable and shall be terminated, and connections to the sanitary sewerage will not be made in most circumstances. Instead, most washracks will treat and recycle washwater. Exterior washing facilities are to be centralized and sited where vehicles leave the training areas to return to the cantonment areas. The overall concept comparing existing and new vehicle washrack practice is given in Figure 1.
3. Central Exterior Wash Facilities. These will consist of two major subsystems: the Wash System and the Wastewater Treatment System.

a. The Wash System The basic wash system will consist of manual wash stations arranged in a "toll booth" configuration. It will also include a vehicle staging area. Where necessary, prewash facilities will be included. Because of the degree of soiling normally experienced, size and other considerations, central wash facilities will normally have separate systems (lanes) for wheeled and tracked vehicles. (Figure 2)

Provision of centralized exterior wash facilities will require paved surface roadways from wash sites to motor pool areas. This is necessary to prevent soiling of the clean vehicles. Tracked vehicle lanes at central wash facilities are to be portland cement concrete (PCC) paved and those lanes for wheeled vehicles are to be PCC or bituminous concrete surfaces based on least cost. Interlocking concrete block or other alternatives shall be considered for cost savings in other surfaces areas where appropriate.

(1) Manual Wash Positions. These will be arranged in a toll booth configuration and equipped with dual hose stations capable of delivering cold water at 15 to 30 gpm water flow rate at 90 to 110 psig water pressure. Figure 2 shows a basic layout similar to the Fort Lewis, WA SW Central Wash facility. Figure 3 depicts the manual hose towers. Figure 4 depicts an Exterior Wash Island plan view.

(2) Prewash Facilities. A prewash vehicle bath will be needed depending upon the vehicle processing rate requirements and soiling conditions. Where a prewash vehicle bath is required, it shall be constructed similar to that constructed at Fort Polk, LA, see Figures 5 & 6. At numerous locations, primarily OCONUS, "spray stands" as prewash options have been constructed and operated satisfactorily for M-60 tanks and other Army vehicles. However, recent experience with the new family of Army vehicles (including M1 Abrams tank) indicate that severe operational problems, both for the wash facility configuration and damages to vehicles may be expected with the spray stand as a prewash system. Inclusion of spray stands as a prewash option at central exterior wash facilities is not recommended. Modifications or retrofit of existing spray stands to accommodate certain new vehicles are under study and the results will be provided in the near future.

b. Wastewater Treatment. Wastewater treatment systems will be sized for maximum wash water and storm water intrusion flow rates. Figure 7 depicts one of the wastewater treatment and recycle system installations at Fort Lewis, WA.

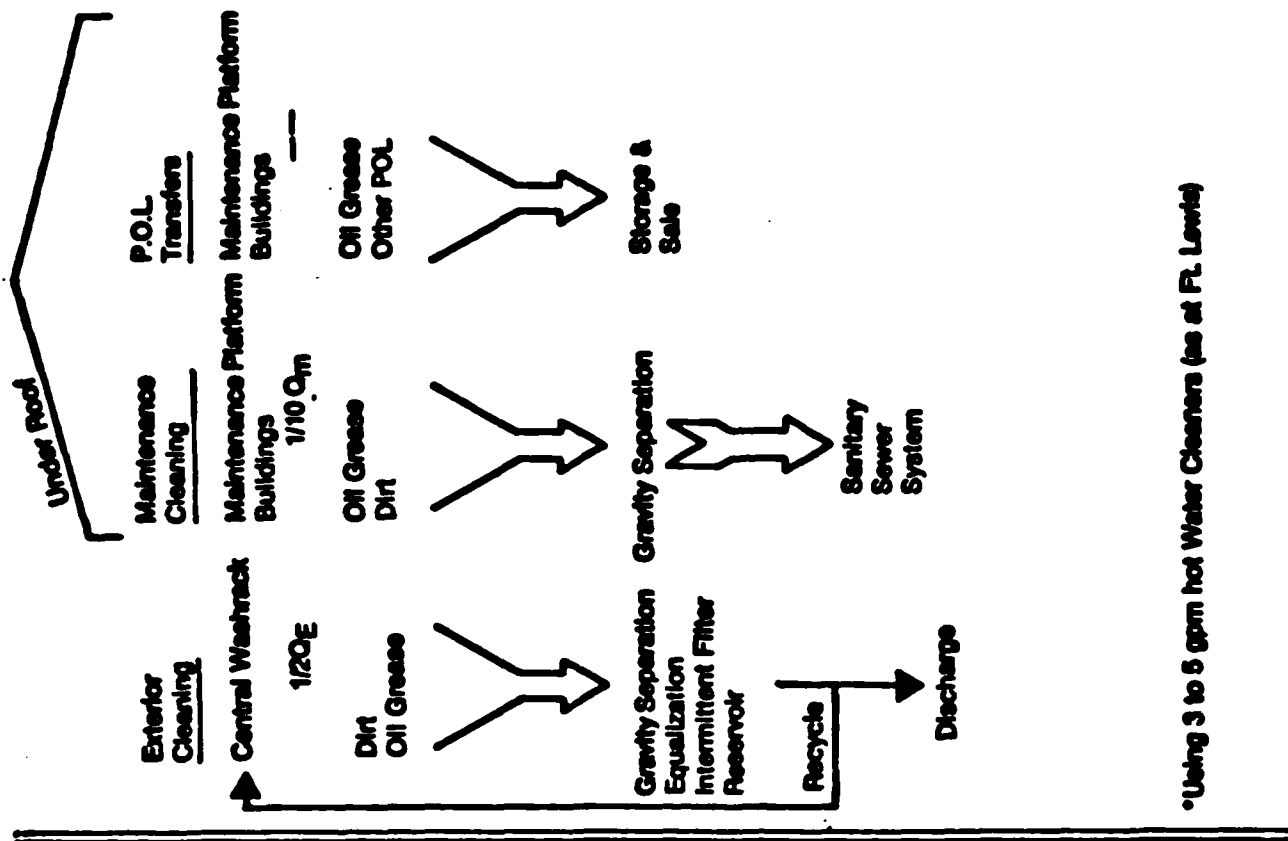
4. Maintenance Cleaning and POL Transfer. These operations, and other scheduled and non-scheduled maintenance activities will be conducted in motor pool maintenance shop areas. Details of new concepts for these operations are shown on Figures 8 and 9. Criteria for these facilities will be issued in the near future. The goal is to provide for maintenance cleaning and POL transfer in the new shop designs.

5. Transportation Motor Pools (TMP) and Reserve or National Guard Areas. At Army installations these areas will frequently require central wash facilities separated from those provided assigned tactical or training units. A plan layout of one such installation is given in Figure 10.

6. Further discussion is provided in CERL Technical Report N-128, May 1982. Detailed design guidance will be provided by Engineer Technical Letter in the near future. In the interim, central vehicle washrack concepts described herein will be followed. Assistance may be obtained from DAEN-MPE-D, Walt Medding, (202) 272-0414 and the US Army CERL-EN, J. Matherly, (217) 352-6511.

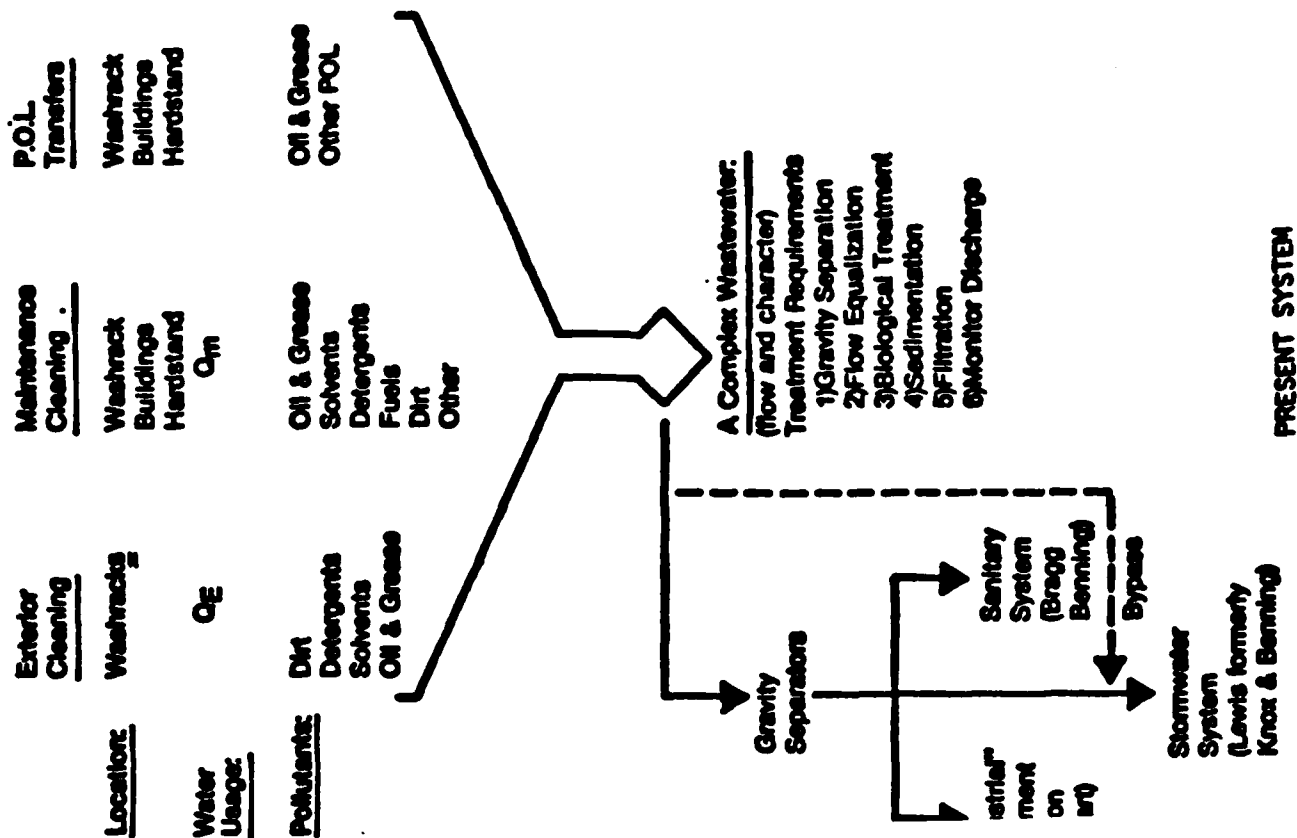
LIST OF FIGURES

- Figure 1 : Overall Concept
- Figure 2 : Site Plan Central Wash Facility (after Ft. Lewis, WA)
- Figure 3 : Detail Island Wash Station (after Ft. Lewis, WA)
- Figure 4 : Detail Islands Spacing (after Ft. Lewis, WA)
- Figure 5 : Plan View Prewash Vehicle Bath (after Ft. Polk, LA)
- Figure 6 : Elevation Prewash Vehicle Bath (after Ft. Polk, LA)
- Figure 7 : Wastewater Treatment/Recycle System (after Ft. Lewis, WA)
- Figure 8 : Tracked Vehicle Maintenance Platform (TVMP) (after Ft. Lewis, WA)
- Figure 9 : Wheeled Vehicle Maintenance Platform Retrofit of Grease Rack (after Ft. Lewis, WA)
- Figure 10 : TMP Central Wash Facility (after Ft. Lewis, WA)

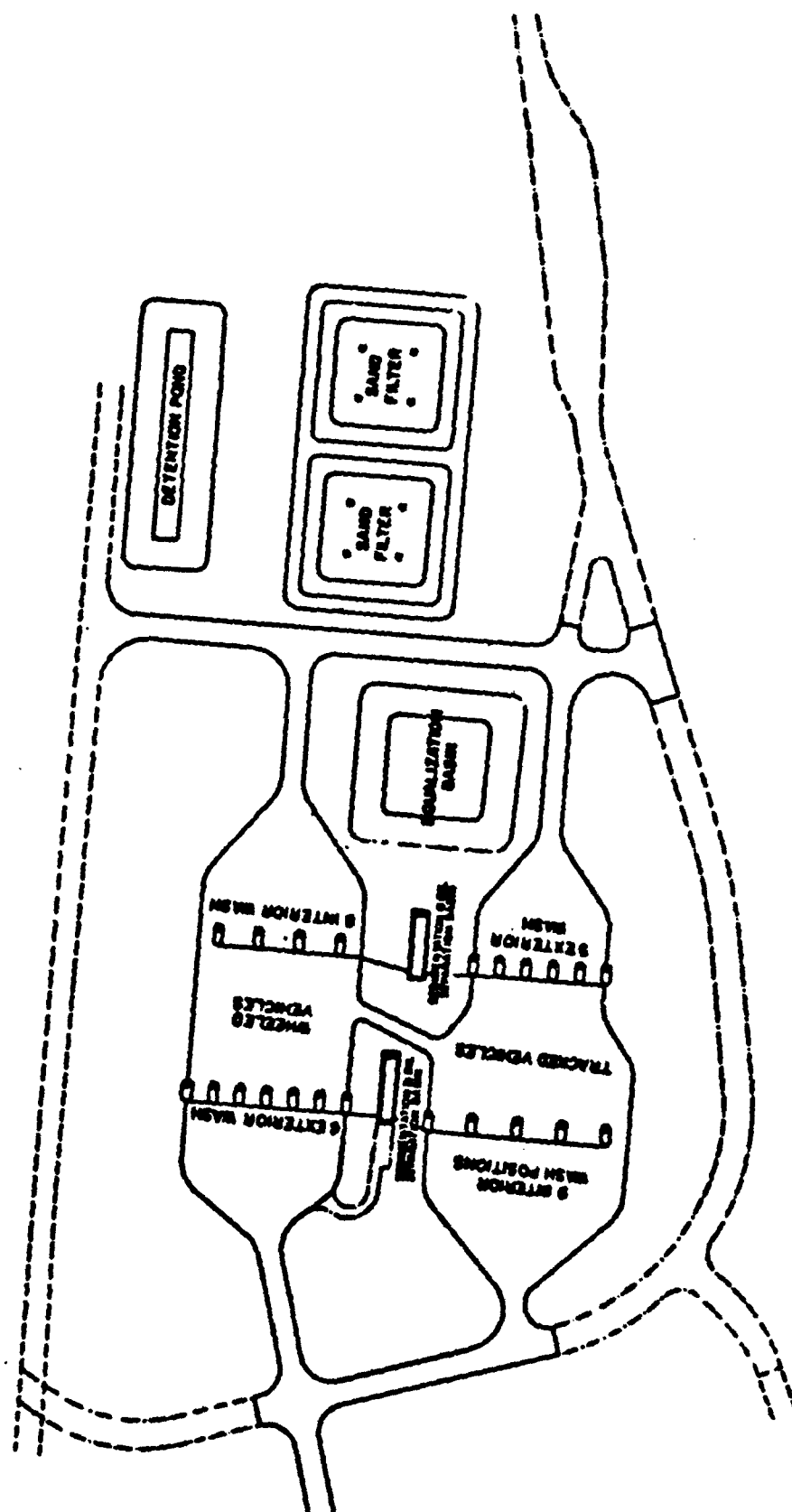


NEW SYSTEM

Figure 1.



PRESENT SYSTEM

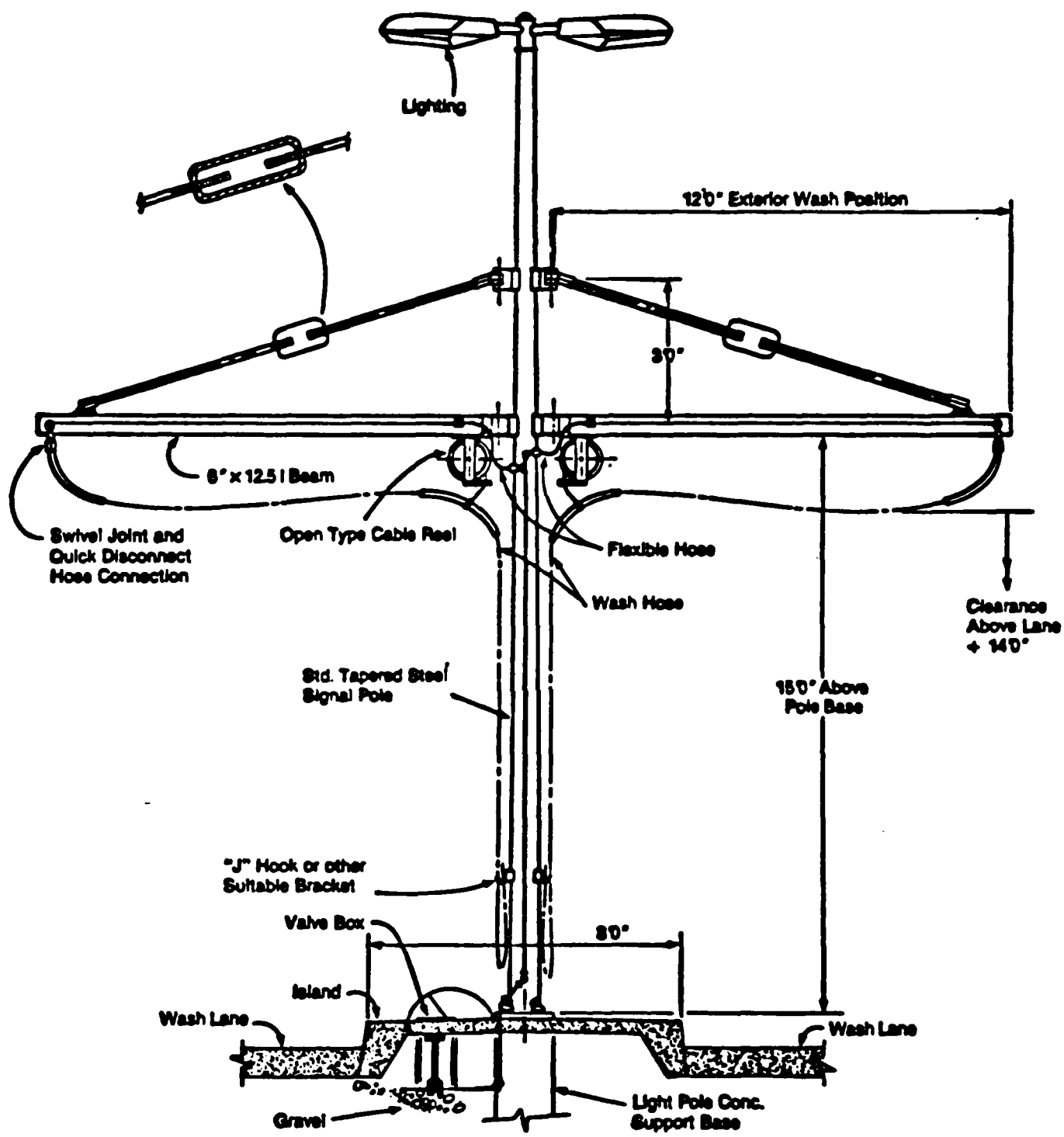


3-7

Centralized vehicle wash facility at Fort Lewis, WA.

Figure 2

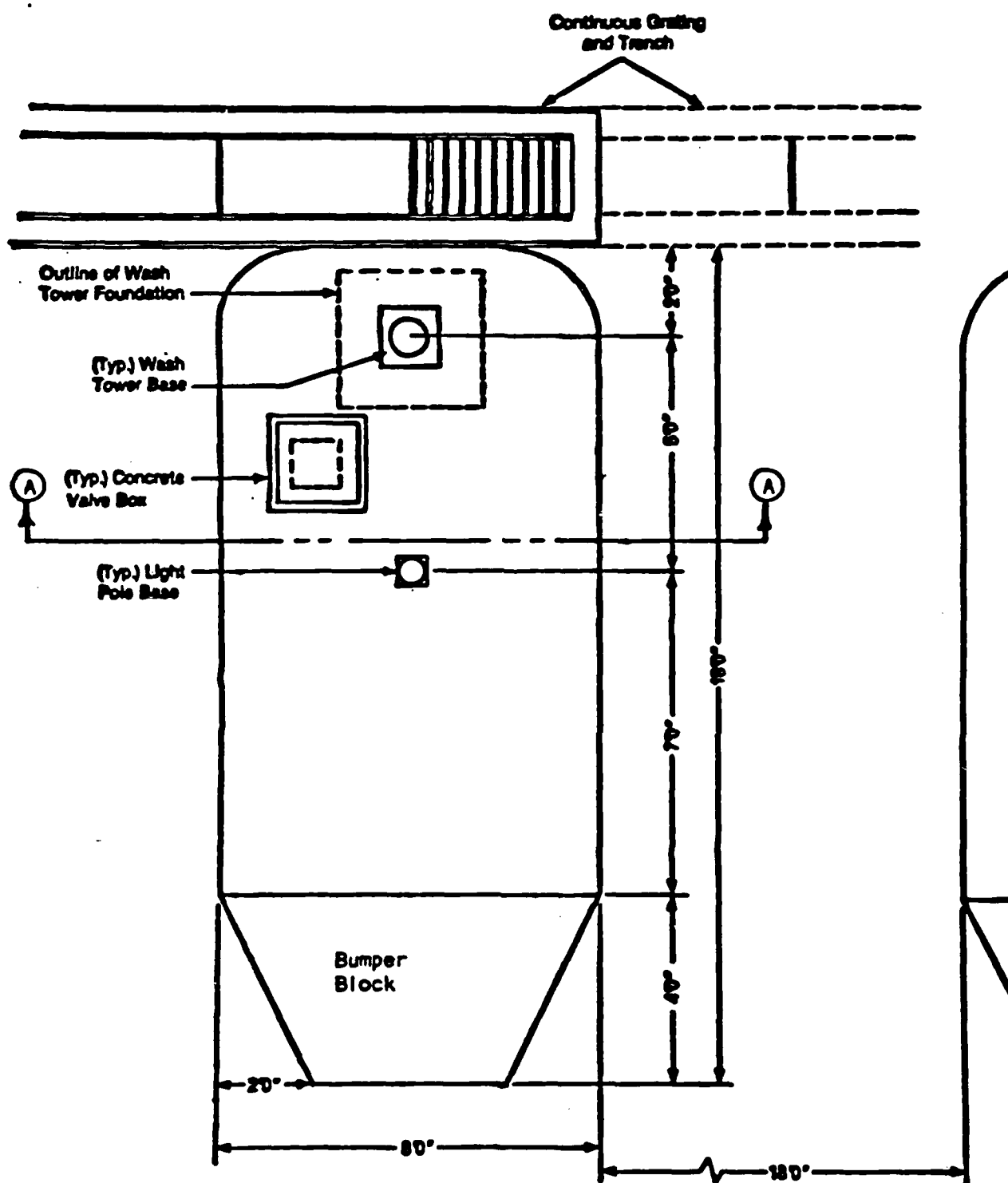
Not to Scale



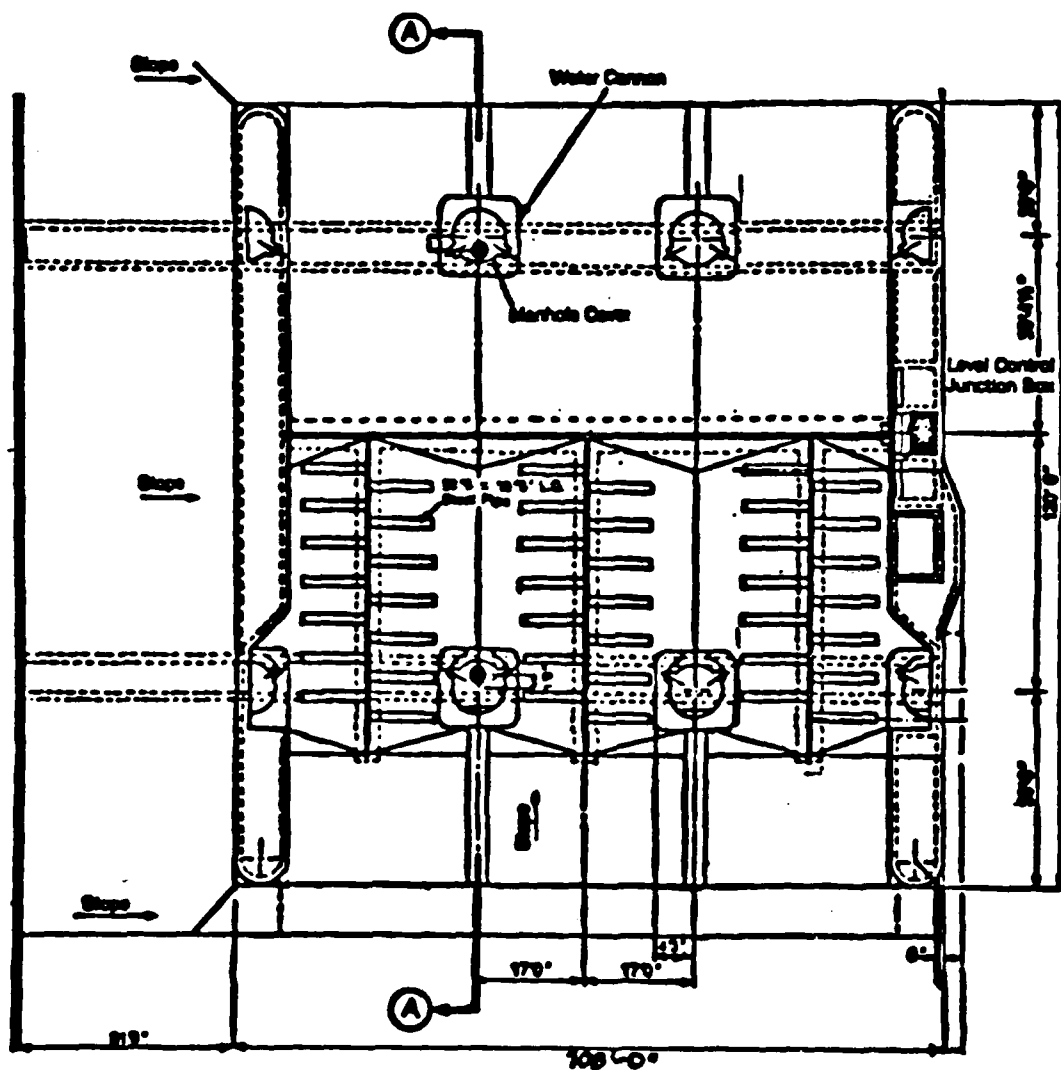
SECTIONAL ELEVATION (A-A)

**Fort Lewis
Vehicle Wash Tower
Figure 3**

Not to Scale



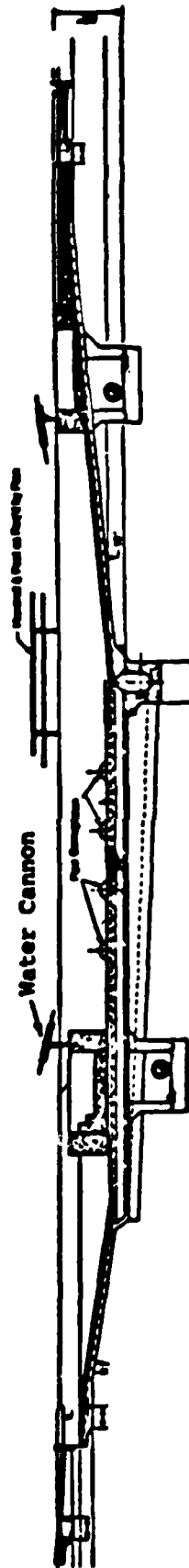
Plan View
Tracked Vehicle
Exterior Wash Island
Figure 4



VEHICLE BATH PREWASH

PLAN VIEW

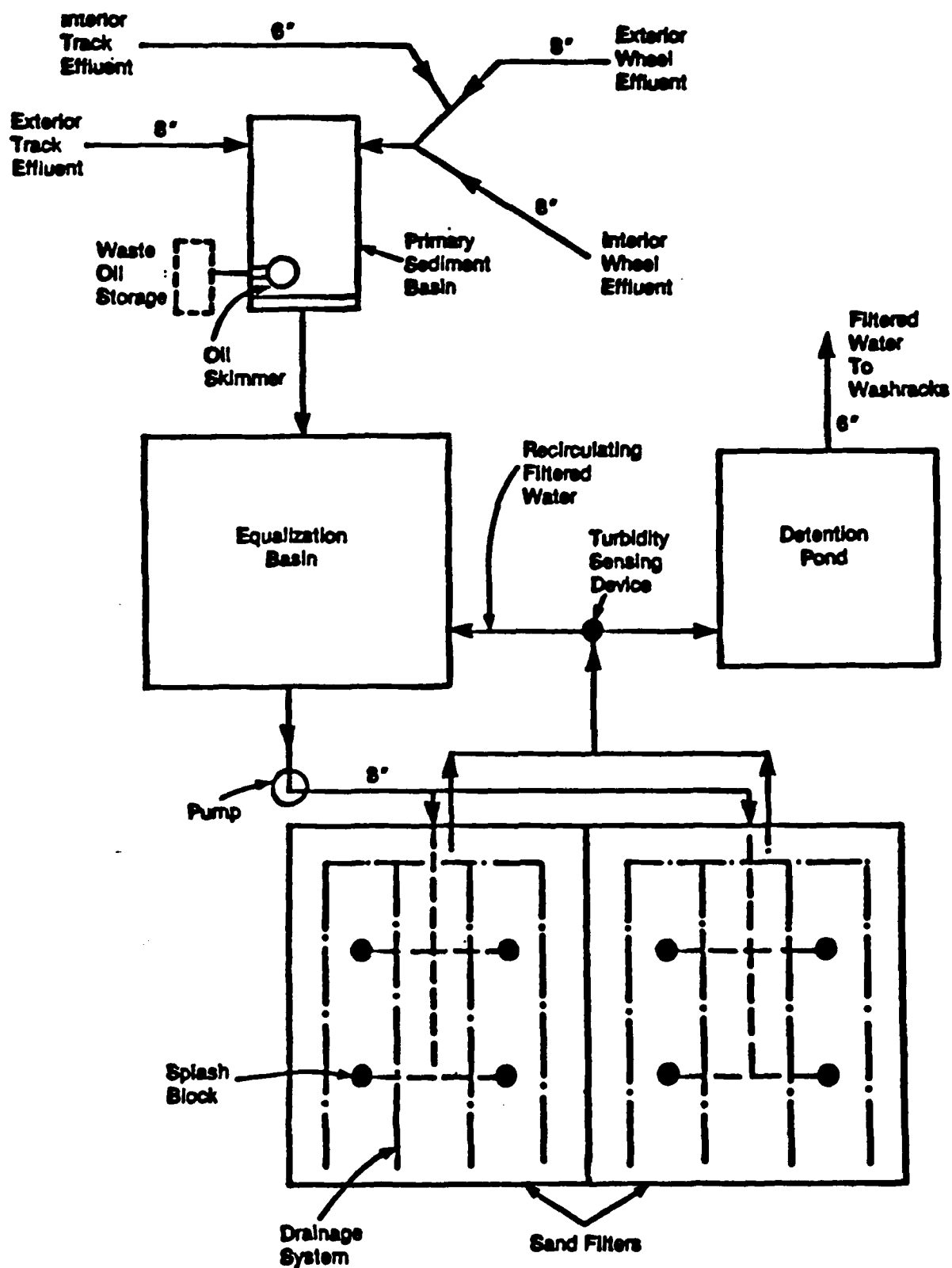
Figure 5



VEHICLE BATH PREWASH

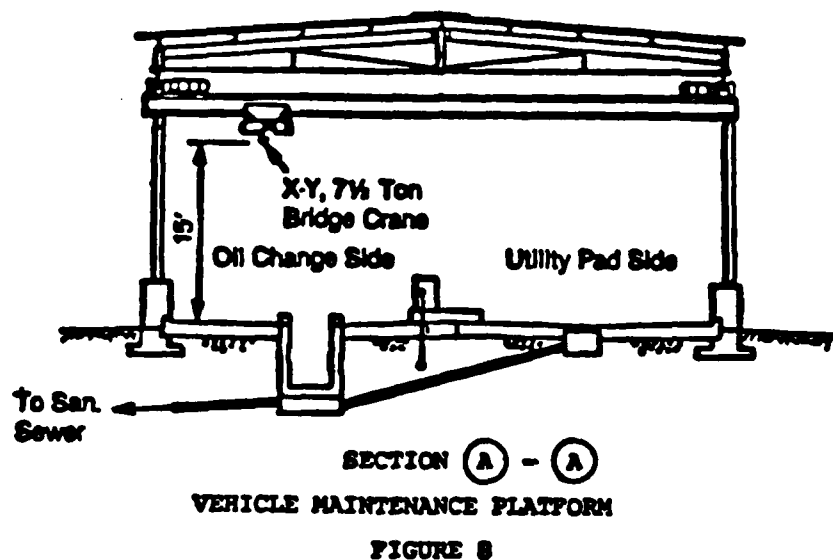
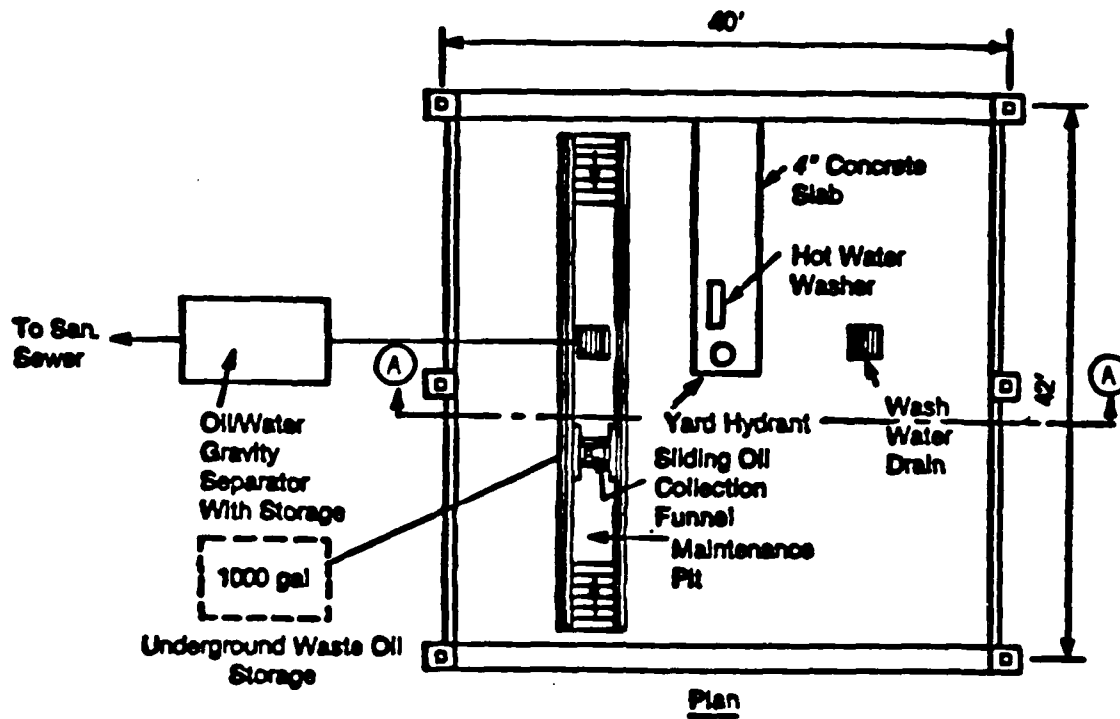
Longitudinal Section (A) - (A)

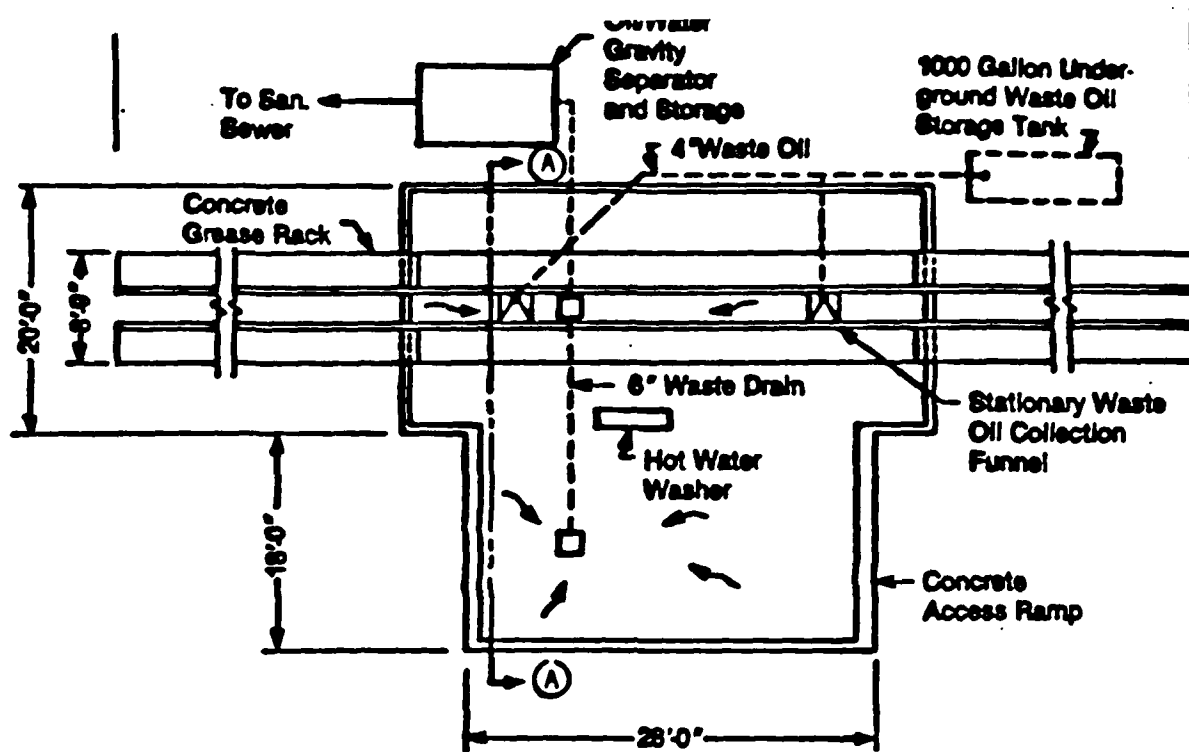
FIGURE 6



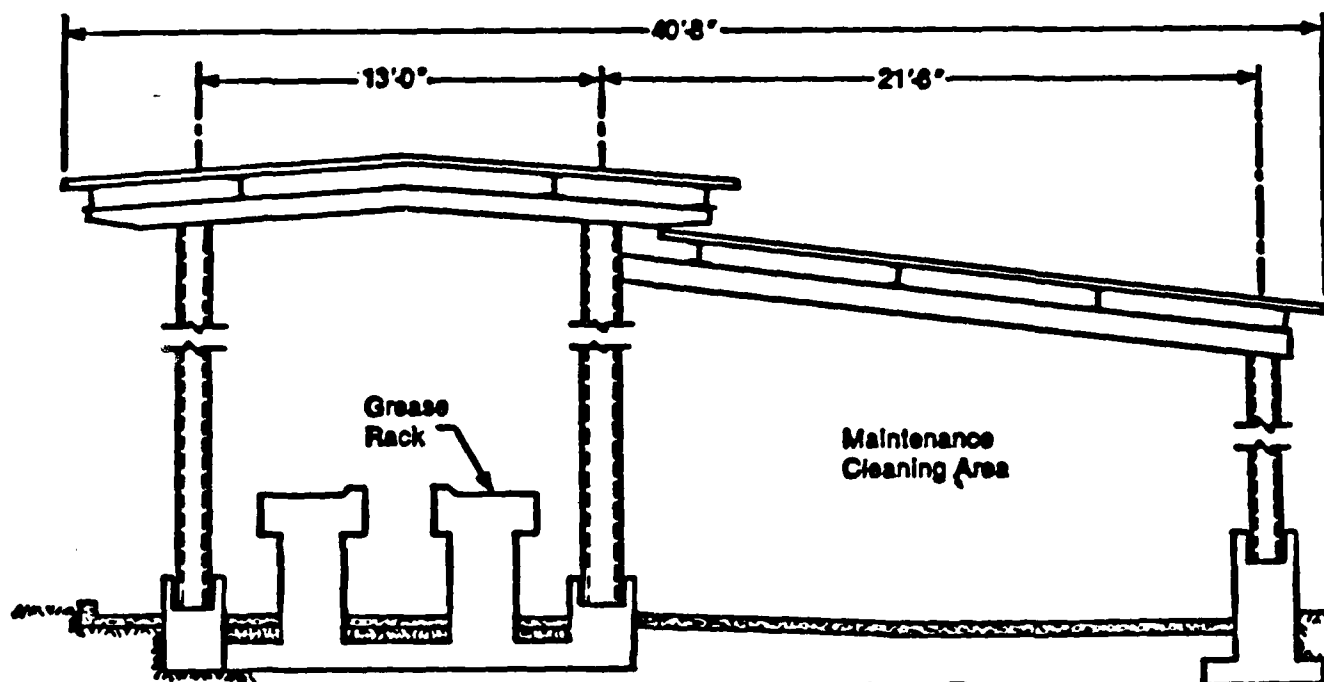
**Treatment/Recycle System
Schematic Plan
Central Wash Facility Fort Lewis**

FIGURE 7





Plan



SECTION A - A

FIGURE 9

WHEELED VEHICLE MAINTENANCE PLATFORM (RETROFIT)
PORT LEWIS, WA.

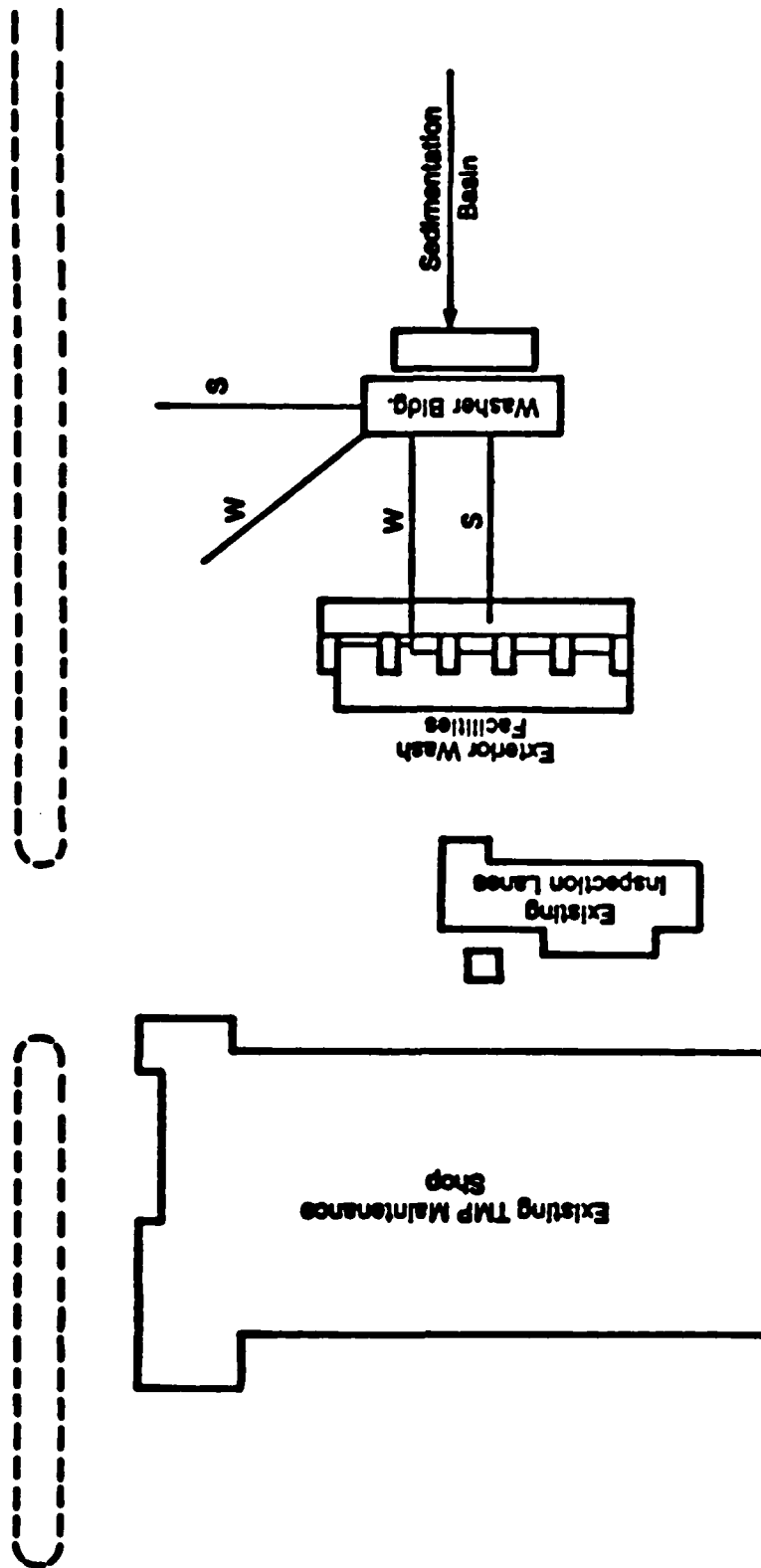


Figure 10
Fort Lewis
Transportation Motor Pool

JOINT MESSAGEFORM										SECURITY CLASSIFICATION	
										UNCLASSIFIED	
PAGE	DTG RELEASE TIME			PRECEDENCE	CLASS	SPECAT	EXT	CT	ORIGINATOR		
DATE TIME	MONTH	DAY	HR	MIN	SEC						
01 OF 02		MAR	84	PP	NR	UUUU		AXT	ZYUW	0651600Z	
MESSAGE HANDLING INSTRUCTIONS											
<p>FROM CDRUSACE WASH DC /DAEN-ECE-G// 13 MAR 84 1603Z</p> <p>TO AIG 9181</p> <p>AIG 9182</p> <p>INFO AIG 7406</p> <p>AIG 7446</p> <p>SUPT/USMA WEST POINT NY</p> <p>ACCT DA-BHCSVD</p> <p>UNCLAS</p> <p>SUBJ: VEHICLE WASHRACKS/SCHEDULED MAINTENANCE FACILITIES</p> <p>POLLUTION CONTROL CENTERS OF EXPERTISE</p> <p>A. DAEN-MPE-D LTR, 19 AUG 82, SUBJ: STANDARDIZATION OF CRITERIA FOR TACTICAL VEHICLE WASH FACILITIES.</p> <p>1. REF ESTABLISHED GENERAL CRITERIA STANDARDS FOR CENTRALIZED VEHICLE WASHRACK FACILITIES (CVWF) AND SCHEDULED MAINTENANCE PLATFORM (SMP) POLLUTION ABATEMENT.</p> <p>2. TO INSURE UNIFORMITY OF CONCEPT APPLICATION AND TO PERMIT CONTINUED SUPPORT BY THE US ARMY CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL) TO BOTH INSTALLATIONS AND CORPS FOA'S, CERL HAS BEEN DESIGNATED A TECHNICAL CENTER OF EXPERTISE IN CONJUNCTION WITH THE US ARMY ENGINEER DISTRICT, SACRAMENTO (SPK), FOR THE DESIGN OF</p> <p>DISTR</p>											
DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE						SPECIAL INSTRUCTIONS					
WALTER WEDDING, DAEN-ECE-G/20484											
5 MAR 84											
TYPED NAME TITLE OFFICE SYMBOL AND PHONE						DIV, D/EC					
WILLIAM N. MC CORMICK, JR, C/ENGR											
SIGNATURE						SECURITY CLASSIFICATION				DATE TIME GROUP	
						UNCLASSIFIED					

JOINT MESSAGEFORM										SECURITY CLASSIFICATION	
										UNCLASSIFIED	
PAGE	DTG RELEASE TIME			PRECEDENCE		CLASS		SIGNAL		COUNTRY	
	DATE TIME	MONTH	YR	ALT	INT						
02 03		MAR	84	PP	RR	UUUU		AT		ZYUW 0651400Z	
MESSAGE HANDLING INSTRUCTIONS											
<p>NO</p> <p>THE SUBJECT FACILITIES.</p> <p>3. FUNCTIONS CURRENTLY ASSIGNED TO CERL ARE AS FOLLOWS:</p> <p style="margin-left: 40px;">A. ASSIST SPK IN DEVELOPING STANDARD DESIGNS FOR THE 3 OR 4 VARIATIONS OF CVWF AND SMP REQUIRED. PROVIDE INPUT TO SAVANNAH DISTRICT DEVELOPMENT INCORPORATING SMP'S INTO TACTICAL EQUIPMENT SHOPS.</p> <p style="margin-left: 40px;">B. WRITE APPROPRIATE DESIGN GUIDES AND TM'S AS A BASIS FOR STANDARD DESIGNS.</p> <p style="margin-left: 40px;">C. ACT AS TECHNICAL ADVISOR TO EACH DISTRICT WHICH IS SITE-ADAPTING THE STANDARD DESIGN.</p> <p style="margin-left: 40px;">D. ASSIST INSTALLATIONS IN DEVELOPING FUTURE REQUIREMENTS UPON REQUEST.</p> <p style="margin-left: 40px;">E. DEVELOP SPECIAL MODIFICATIONS TO THE STANDARD DESIGNS AS REQUIRED BY INDIVIDUAL SITUATIONS.</p> <p style="margin-left: 40px;">F. CONTINUE TO REVIEW AND UPDATE THE STANDARDS AS TECHNOLOGY CHANGES.</p> <p style="margin-left: 40px;">G. REVIEW DESIGNS TO ASSURE INCORPORATION OF APPROPRIATE TECHNOLOGY AND "LESSONS LEARNED."</p> <p>4. FUNCTIONS CURRENTLY ASSIGNED TO SPK ARE AS FOLLOWS:</p> <p style="margin-left: 40px;">A. IN COORDINATION WITH CERL, DEVELOP STANDARD DRAWINGS AND</p>											
DISTR.											
DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE						SPECIAL INSTRUCTIONS					
RELEASE	TYPED NAME TITLE OFFICE SYMBOL AND PHONE										
	SIGNATURE										
						SECURITY CLASSIFICATION			DATE TIME GROUP		
						UNCLASSIFIED					

JOINT MESSAGEFORM										SECURITY CLASSIFICATION UNCLASSIFIED			
PAGE	DTG RELEASE TIME				PRECEDENCE		CLASS	SPECIAL	TIME	CC	GR. NO. (1-10)		
	DATE TIME	MONTH	YEAR	ACT	INT								
03-03		MAR	84	PP	RR	UUUU			AT	ZYUW	0651600Z		
PAGE NO	MESSAGE HANDLING INSTRUCTIONS												
<p>SPECIFICATIONS FOR THE 3 OR 4 VARIATIONS OF CVWF AND SMP REQUIRED TO BE USED BY DISTRICTS IN THEIR DESIGN OF THESE PROJECTS.</p> <p>B. PARTICIPATE IN PROJECT PREDESIGN CONFERENCES, CONCEPT AND FINAL DESIGN REVIEWS.</p> <p>C. PROVIDE CONSULTING SERVICES AS REQUIRED DURING DESIGN AND CONSTRUCTION.</p> <p>5. COORDINATION OF THE CENTER OF EXPERTISE ACTIVITIES WILL BE ACCOMPLISHED BY DAEN-ECE-G. POINTS OF CONTACT ARE: DAEN-ECE-G, W. MEDDING, (202) 272-0414; CERL-EN, J. MATHERLY (217) 373-7233; AND SPKED-M, R. DABROWIAK (916) 440-2610.</p> <p>6. CONCEPT AND FINAL DESIGN SUBMISSIONS FOR ALL CENTRALIZED WASHRACK PROJECTS NOT PRESENTLY UNDER CONSTRUCTION SHOULD BE FORWARDED FOR CERL AND SPK REVIEW. IN GENERAL, CERL APPROVAL WILL BE REQUIRED BEFORE CONSTRUCTION AUTHORIZATION IS GIVEN FOR CENTRALIZED WASHRACKS.</p>													
<div style="position: absolute; left: -40px; top: 50%; transform: translateY(-50%); font-weight: bold;">6 5 4 3 2 1 0</div>													
DISTR													
DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE						SPECIAL INSTRUCTIONS							
RELEASER	TYPED NAME TITLE OFFICE SYMBOL AND PHONE												
	SIGNATURE												
						SECURITY CLASSIFICATION UNCLASSIFIED			DATE TIME GROUP				

3.3 DAEN-ECE-G Message, 19 June 1984

JOINT MESSAGEFORM

UNCLASSIFIED

01 02

JUN 84 PP PP UUUU

19 JUN 84 1700

1700900Z

NO

FROM: CDRUSACE WASH DC //DAEN-ECE-G//

TO: AIG 9181

AIG 9182

INFO: AIG 7406

AIG 7446

CDRUSAECERL CHANUTE AFB IL

SUPT USMA WEST POINT NY

ACCT DA-BHCSVD

UNCLAS

SUBJECT: CENTRALIZED VEHICLE WASH FACILITIES

A. DAEN-MPE-D LTR, 19 AUG 82, SUBJ: STANDARDIZATION OF CRITERIA FOR TACTICAL VEHICLE WASH FACILITIES.

B. DAEN-ECE-G MSG 1316032 MAR 84

1. REF A ESTABLISHED GENERAL CRITERIA STANDARDS FOR CENTRALIZED VEHICLE WASHRACK FACILITIES (CVWF) AND SCHEDULED MAINTENANCE PLATFORM (SMP) POLLUTION ABATEMENT.

2. REF B DELINEATED CENTER-OF-EXPERTISE (COE) FUNCTIONS OF CERL AND SPK. THIS MSG PROVIDES CLARIFICATION OF POLICY PERTAINING TO COE AUTHORITY.

3. IT IS THE INTENTION OF THIS HEADQUARTERS THAT PROJECT DESIGNS BE

D:STA

1. NAME, TITLE, OFFICE SYMBOL, PHONE

W. S. MEDDING, DAEN-ECE-G, 20415
18 JUN 84

SPECIAL INSTRUCTIONS

2. NAME, TITLE, OFFICE SYMBOL, AND PHONE

W.N. MCCORMICK, JR., C/ENGR DIV,
E&C

20397

SECURITY CLASSIFICATION

UNCLASSIFIED

DATE/TIME GROUP

DD FORM 173-2 (OCR)

PREVIOUS EDITION IS OBSOLETE

3-19

U.S. GPO 1980 3-19-13

E 2-19-13

JOINT MESSAGEFORM

UNCLASSIFIED

02 02

JUN 84 PP PP UUUU

AT ZYUW 1700900Z

NO

ACCOMPLISHED IN ACCORDANCE WITH THE STANDARDS DESCRIBED BY REF A AS THEY MAY BE AMENDED BY LESSONS LEARNED OR DICTATED BY VARYING SITE CONDITIONS AND AGREED TO BY CERL. THE CVWF TREATMENT SUBSYSTEM MUST BE DESIGNED AND CONSTRUCTED TO MEET SPECIFIC SITE REQUIREMENTS AND NEEDS. THE BASIC TREATMENT SYSTEM WILL CONSIST OF FOUR STAGES: (1) PRIMARY TREATMENT BASINS, (2) EQUALIZATION BASINS, (3) INTERMITTENT SAND FILTRATION, AND (4) STORAGE OR DETENTION BASIN. TWO EXCEPTIONS MAY BE CONSIDERED UNDER CERTAIN CONDITIONS. FIRST, IF SPACE EXISTS FOR A VERY LARGE POND SYSTEM, THAT MAY BE USED IF TECHNICALLY AND ECONOMICALLY FEASIBLE. FOR EXAMPLE, AT FORT POLK, EACH 25 VEHICLE PER HOUR CVWF UTILIZES A TREATMENT POND OF APPROXIMATELY 25 MILLION GALLONS CAPACITY. SECOND, IF RECYCLING OF WASHWATER IS NOT PRACTICAL NOR ECONOMICAL, CONNECTION MAY BE MADE TO SANITARY SEWERAGE FOLLOWING PRETREATMENT IN PRIMARY TREATMENT BASINS. BOTH OF THESE EXCEPTIONS MUST BE APPROVED BY CERL AS CENTER-OF-EXPERTISE.

4. THE ABOVE INSTRUCTION DOES NOT PRECLUDE CONSIDERATION OF OTHER TREATMENT PROCESSES WHERE CONDITIONS PERMIT. HOWEVER, ALTERNATE PROPOSALS MUST BE FULLY COORDINATED WITH AND APPROVED BY CERL.

DISTR

DRAFTER TYPE NAME TITLE OFFICE SYMBOL AND PHONE

SPECIAL INSTRUCTIONS

TYPE NAME TITLE OFFICE SYMBOL AND PHONE

SIGNATURE

SECURITY CLASSIFICATION

UNCLASSIFIED

DATE TIME GROUP

3.4 DAEN-ECE-G Message, 12 August 1985

*DEDICATED TO *
*EXCELLENCE IN *
COMMUNICATIONS

* UNCLASSIFIED *

BE ALL YOU CAN BE

PENTAGON
TELECOMMUNICATIONS CENTER

ROUTINE
R 121412Z AUG 85
FM CDRUSACE WASH DC //DAEN-ECE-G/DALO//
TO AIG 7406
AIG 9181
SUPT USMA WEST POINT NY
CDRUSAEDPO FT SHAFTER HI
CDRUSAED FAR EAST SEOUL KOREA
ACCT DA-BHCSVD

ZYUW RUKGNEA3819 2241448

AIG 7446
AIG 9182
CDRUSAED FRANKFURT GERMANY
CDRUSAED JAPAN CPZAMA JAPAN
CDRUSAECERL CHANUTE AFB IL

UNCLAS

**SUBJECT: CENTRALIZED VEHICLE WASHRACKS AND SCHEDULED MAINTENANCE
POLLUTION ABATEMENT**

- A. DAEN-MPE-D LTR, 19 AUG 82, SUBJ: STANDARDIZATION OF CRITERIA FOR
TACTICAL VEHICLE WASH FACILITIES.
B. DAEN-ECE-G MSG 131603Z MAR 84.
C. DAEN-ECE-G MSG 191531Z JUN 84.

1. REF A ESTABLISHED GENERAL CRITERIA STANDARDS FOR CENTRALIZED VEHICLE
WASHRACK FACILITIES (CVWF) AND SCHEDULED MAINTENANCE PLATFORM (SMP) FOR
POLLUTION ABATEMENT DURING MAINTENANCE CLEANING AND POL TRANSFERS.

2. REF B DELINEATED CENTER-OF-EXPERTISE FUNCTIONS OF THE U.S. ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORY (USACERL) AND THE U.S. ARMY
ENGINEER DISTRICT, SACRAMENTO (SPK).

3. REF C PROVIDED CLARIFICATION OF CVWF WASTEWATER TREATMENT STANDARDS AND
THE ROLE OF USACERL IN APPROVING EXCEPTIONS.

4. THIS MESSAGE CONFIRMS THE CRITERIA AND INSTRUCTIONS OF THE ABOVE
REFERENCES TO BE DA POLICY AND PROVIDES ADDITIONAL INFORMATION AND
CLARIFICATIONS.

ACTION DAEN (O) (U,A,P)
INFO DAEN-ZC(*) SCB REVIEW(*) DACS-DMS(*)

TOTAL COPIES REQUIRED 0

MCN=85224/11855

TUR=85224/1530Z

TAD=85224/1531Z

CDSN= COE213

* UNCLASSIFIED *

PAGE 01
121412Z AUG 85

*DEDICATED TO *
*EXCELLENCE IN *
COMMUNICATIONS

* UNCLASSIFIED *

BE ALL YOU CAN BE

PENTAGON
TELECOMMUNICATIONS CENTER

5. IT IS DA POLICY THAT WASH FACILITIES BE CONSOLIDATED AT INSTALLATIONS TO THE MAXIMUM PRACTICABLE EXTENT. IT IS ALSO DA POLICY THAT DESIGNS OF NEW TACTICAL EQUIPMENT MAINTENANCE SHOPS INCORPORATE SCHEDULED MAINTENANCE FACILITIES (SMF) IN ACCORDANCE WITH STANDARD PLANS. SMP'S SHOULD BE PROGRAMMED AT INSTALLATIONS WHERE (1) CVWF ARE BEING PROGRAMMED AND (2) EXISTING PERMANENT TACTICAL MAINTENANCE SHOPS DO NOT CONTAIN AND CANNOT BE ALTERED TO INCLUDE SMF'S. IN SOME CASES, EXCEPTIONS TO STANDARDS FOR EITHER CVWF'S OR SMF'S MAY BE JUSTIFIED. IN SUCH CASES, EXCEPTIONS MUST BE APPROVED BY DAEN-ECE. THE SPRAYSTAND PREWASH AS WELL AS LAGOON TREATMENT SYSTEM FOR CVWF'S ARE CONSIDERED EXCEPTIONS REQUIRING DAEN-ECE APPROVAL. IT IS ALSO DESIRABLE THAT INSTALLATIONS HAVING SIGNIFICANT NATIONAL GUARD AND/OR RESERVE TRAINING ACTIVITIES INCLUDE THOSE VEHICLE CLEANING REQUIREMENTS IN CVWF'S.

6. APPARENTLY, CONFUSION STILL EXISTS RELATIVE TO SMP'S AND CVWF'S ESPECIALLY REGARDING THEIR INTENDED UTILIZATION. THE FOLLOWING IS PROVIDED FOR CLARIFICATION:

A. THE SMP IS A NEW TYPE OF FACILITY WHICH PERMITS EFFICIENT PERFORMANCE OF SCHEDULED MAINTENANCE ACTIVITIES SUCH AS PULLING AND CLEANING ENGINE PACKS, CLEANING ENGINE COMPARTMENTS, CHANGING OIL AND ANTIFREEZE, CHASSIS LUBRICATION, ETC., WITH THE ELIMINATION OF ENVIRONMENTAL POLLUTION COMMONLY EXPERIENCED FROM THESE TAKING PLACE ON VEHICLE WASHRACKS AND ADJACENT AREAS. THE SMP IS NOT INTENDED AS REPLACEMENT FOR A VEHICLE WASHRACK EXCEPT FOR THE ABOVE USES.

B. IT IS UNDESIRABLE TO COLOCATE SMP'S AND VEHICLE WASHRACKS BECAUSE OF THE TENDENCY TO PERFORM MAINTENANCE CLEANING AND OTHER SIMILAR ACTIVITIES ON WASHRACKS. ADDITIONALLY, COMBINING WASTEWATERS FROM THESE FACILITIES IN A SINGLE TREATMENT FACILITY CREATES A COMPLEX WASTEWATER AND DEFEATS THE INTENT OF SEPARATING EXTERIOR WASHING AND MAINTENANCE CLEANING TO IMPROVE POLLUTION ABATEMENT. IT IS DESIRABLE THAT SMP'S BE LOCATED ADJACENT TO OR AS PART OF MAINTENANCE SHOPS. VEHICLE WASHRACKS SHOULD BE LOCATED NEAR TANK TRAIL ACCESS ROADS OR SIMILAR LOCATIONS TO PERMIT CLEANING OF VEHICLES AS THEY RETURN FROM FIELD TRAINING AREAS PRIOR TO ENTRY ONTO PUBLIC ROADS. PREFERABLY WASHRACKS SHOULD BE CENTRALIZED TO SERVE MORE THAN ONE ORGANIZATION AND PERMIT THE ECONOMY OF WATER RECYCLING. BOTH SMP'S AND CVWF'S HAVE PROVEN TO BE HIGHLY EFFICIENT AND OPERATIONALLY ADVANTAGEOUS BOTH IN CONUS AND IN EUROPE WHERE REAL ESTATE IS ALSO VERY LIMITED.

MCN=85224/11855

TUR=85224/1530Z

TAD=85224/1531Z

CDSN= COE213

PAGE 02

* UNCLASSIFIED *

121412Z AUG 85

*DEDICATED TO *
*EXCELLENCE IN *
COMMUNICATIONS

* UNCLASSIFIED *

BE ALL YOU CAN BE

PENTAGON
TELECOMMUNICATIONS CENTER

7. USACERL HAS BEEN DESIGNATED A MANDATORY CENTER-OF-EXPERTISE (MTCX) AND SPK HAS BEEN DESIGNATED A TECHNICAL CENTER-OF-EXCELLENCE (TCX) FOR THE SUBJECT FACILITIES. IT IS ANTICIPATED THAT THESE DESIGNATIONS WILL REMAIN IN EFFECT FOR UP TO TWO MORE YEARS AFTER WHICH SPK WILL TAKE OVER THE PRESENT USACERL ROLE. USACERL WILL THEN REMAIN ASSOCIATED WITH SPK AS A SUPPORTING LABORATORY. BOTH AGENCIES HAVE BEEN FUNDED TO ACCOMPLISH CERTAIN ACTIVITIES ON A NON-REIMBURSABLE BASIS. THESE INCLUDE ASSISTING INSTALLATIONS IN PREPARATION OF PROGRAMMING DOCUMENTS (DD FORMS 1391) BY PROVIDING TECHNICAL GUIDANCE. ACTUAL DOCUMENT PREPARATION IS NOT INCLUDED.

8. IN ACCORDANCE WITH REF B THE MTCX WILL REVIEW ALL DESIGN SUBMISSIONS REQUIRED BY DESIGN CONTRACTS. FOR IN-HOUSE DESIGNS, THE MTCX WILL REVIEW AT COMPARABLE DESIGN STAGES TO THOSE NORMALLY OBTAINED DURING AE CONTRACTING. MTCX REVIEWS WILL INCLUDE: (1) ASSURING THAT BASIC PROCESSES, SIZES, SITING, ETC., ARE IN ACCORDANCE WITH EXISTING CRITERIA AND GUIDANCE, (2) ASSURING THAT USER REQUIREMENTS WILL BE MET WITH REGARD TO PERFORMANCE CHARACTERISTICS, PROCESSING RATES, TREATMENT CAPABILITY AND CAPACITY, MAINTAINABILITY AND OPERABILITY, AND (3) ASSURING INCORPORATION OF LESSONS LEARNED AS APPROPRIATE. THE MTCX WILL NOT BE RESPONSIBLE FOR OTHER REVIEW FUNCTIONS OF DESIGN AGENCIES SUCH AS SPECIFICATIONS, STRUCTURAL DESIGN, FOUNDATIONS, PAVEMENTS, MECHANICAL, ELECTRICAL AND ARCHITECTURAL DESIGNS. ACCORDINGLY, THE MTCX REVIEW WILL SUPPLEMENT NORMAL DESIGN AGENCY REVIEW AND RESPONSIBILITY, NOT REPLACE IT.

9. COORDINATION OF THE CENTER-OF-EXPERTISE ACTIVITIES WILL BE ACCOMPLISHED BY DAEN-ECE-G. POINTS OF CONTACT ARE: DAEN-ECE-G, W. MEDDING, (202) 272-0415; CERL-EN, J. MATHERLY (800) USA-CERL, EXT. 233, AND SPKED-M, S. WHIPPLE (916) 551-2016.

10. REFERENCES CITED ABOVE HAVE PREVIOUSLY BEEN FORWARDED TO MOST ADDRESSEES. THOSE WHO WERE NOT ADDRESSEES ON REFERENCES WILL BE SENT COPIES BY MAIL. ADDITIONAL COPIES WILL BE MAILED TO OTHERS ON REQUEST. BT

MCN=85224/11855

TUR=85224/1530Z

TAD=85224/1531Z

CDSN= COE213

* UNCLASSIFIED *

PAGE 03
121412Z AUG 85

4.0 PROJECT REQUIREMENTS

- 4.1 DD Form 1391, Military Construction Line Item Data, Consolidated Vehicle Washing Facilities with Oil and Sediment Pollution Control (Pilot Project) (Fort Lewis, 2 July 1977)
- 4.2 Appendix A, TM 5-800-3, Project Development Brochure, Part I - Functional Requirements, Consolidated Vehicle Wash Facilities, Fort Lewis, Washington, Fiscal Year Program 1979.

NO-A165 888

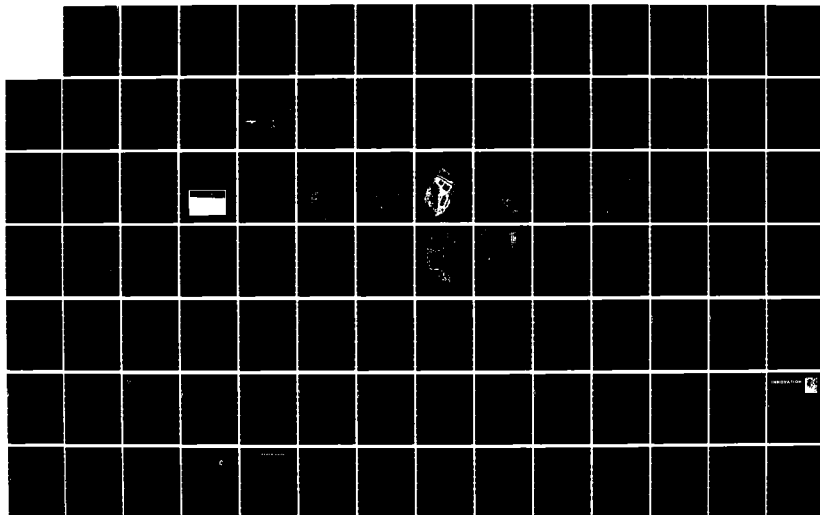
INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS
WASTE AT DOD FACIL. (U) CH2M HILL RESTON VA
T E HIGGINS ET AL. DEC 85 DACA87-84-C-0076

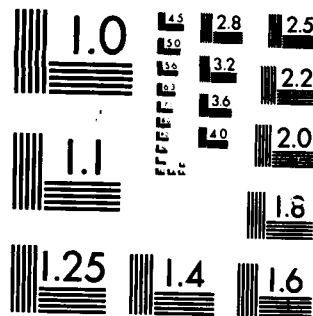
2/3

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DATE		FISCAL YEAR		MILITARY CONSTRUCTION LINE ITEM DATA		SUPPLEMENTARY DATA		INSTALLATION	
16 NOV 77		1979		Rev 2 JUL 1977		Army		Fort Lewis	
§ 3,319,000		P.L.		831		WASHINGTON		Washington	
§ 3,319,000		6100		373		POL Pollution Control		POL Pollution Control	
SECTION A - DESCRIPTION OF LINE ITEM									
PHYSICAL CHARACTERISTICS OF PRIMARY FACILITY									
CONSTRUCT 2 Centralized track and wheel vehicle washrack facilities, 1 commercial-type vehicle washrack facility and 1 washrack facility for North Fort units. Tracked washrack: control buildings (outlined above), with ext and int wash bays. Adjacent wheel washrack with int wash bays and high pressure fixed nozzle ext wash areas. North Fort washrack: 1 control building, with int wash bays, ext wash bays for track vehicles and high pressure fixed nozzle ext wash for wheel vehicles. Water runoff to be filtered of solids and oil, all water captured (est. 20% losses due to evaporation, water in splids etc.) will be recycled. Construct concrete tank trails to canyon area. Construct waste water treatment facility at Flora Road Outfall									
SECTION B - COST ESTIMATES									
WASHRACKS & APPURTENANCES									
Cent Track Wash Rack & Veh Wash									
N. Fort Veh Washrk									
Commercial Vehicle Washrk									
Concrete Track Veh Roads									
Flora Road Outfall									
TOTAL LINE ITEM COST									
\$ 3,319,300									
SECTION C - BASIS OF REQUIREMENT									
This project is required to comply with USEPA and State of Washington wastewater effluent limitations for Fort Lewis. The 75 washracks currently in use are discharging effluent containing suspended solids, oil and grease to stormwater channels which ultimately drain into Puget Sound. It is essential that these sources of contamination be abandoned as soon as possible to comply with USEPA discharge permit No. WAD00258-5. If this project is not approved, there will be continued contamination of the aquatic environment and probable legal action taken by the USEPA in view of noncompliance with NPDES permit. There will be no disposal of the old washrack facilities.									

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

1 of 4

1. DATE 1 JUL 1977	2. FISCAL YEAR 1979	MILITARY CONSTRUCTION PROJECT DATA (Continued)	3. DISPOSITION Army	4. INSTALLATION Fort Lewis, Washington
5. PROJECT NUMBER T49800		6. PROJECT TITLE Consolidated Vehicle Washing Facilities with Oil and Sediment Pollution Control (Pilot-Project)		

1. GENERAL:

This project will centralize wheel (rubber-tire) and tracked tactical vehicle washracks into one facility to effectively pre-treat and dispose of washrack wastewater in compliance with USEPA effluent limitations. The centralized washrack facility will be located southeast of the intersection of East Gate Road and Fourth Division Drive. In addition, a smaller washrack facility will be constructed on North Fort Lewis (north side of Interstate 5) for those units not having access to the major facility. This facility will be located near the intersection of Eleventh Street and Southern Drive. Wastewater from the above two facilities will be treated, 80% of which will be recycled and 20% discharged to natural surface drainage adjacent to the facility. The non-tactical vehicle wash facility will consist of a high pressure, low-volume, drive-through, rubber-tired facility for commercial type vehicles. Wastewater from this facility will be discharged into the sanitary sewer system. This facility will be located at the DIO, Transportation Motor Pool off Railroad Avenue. See site plan, and sketches of wash facilities attached. This project includes construction of concrete tracked vehicle roads to cantonment areas from vehicle washing facilities.

2. ACCOMMODATIONS NOW IN USE:

There are 75 concrete platform washracks used for wheel and tracked vehicles. Washing of all tactical vehicles on post is performed using hand-held hoses. The washing equipment provided consists of one and one-half inch diameter rubber hose equipment with a 5/8 inch nozzle. Potable water is supplied at main pressure through a 1-1/4 inch or 1-1/2 inch diameter standpipe and shutoff valve. Wastewater generated by vehicle washing operations discharges directly into the stormwater collection network. Treatment generally consists of a single-chambered sediment trap with a T-outlet pipe. Existing treatment facilities are inadequate and not effective in removing contaminants. Washracks do not comply with NPDES Discharge permit effluent limitations.

3. ANALYSIS OF DEFICIENCIES:

NPDES discharge permit number WA-000258-5 governs stormwater discharge from Fort Lewis. Effluent limitations and monitoring requirements are for pH, oil and grease. Some of the primary sources of stormwater contamination are existing vehicle washracks. Existing facilities waste large quantities of potable water and reduce troop training time. It is imperative to correct the present deficiencies.

4. CONSIDERATION OF ALTERNATE FACILITIES:

Alternate washrack facilities that comply with USEPA permit requirements do not exist at Fort Lewis or nearby vicinities. It is essential to wash tactical vehicles at Fort Lewis. No other off post facility would be practical.

5. CRITERIA FOR PROPOSED CONSTRUCTION:

The proposed construction is essential to comply with USEPA and State of Washington wastewater discharge requirements. Fort Lewis will continue to be in non-compliance with NPDES discharge permit no. WA-00258-5 as long as contaminated wash water enters the stormwater collection network. Technical information is found in Technical Report E-80, Demonstration of Washrack Wastewater Recycle, prepared by the US Army Construction Engineering Research Laboratory, Champaign, Illinois as requested on 10 Feb 1976 by the Office of the Chief of Engineers, Washington, DC. Design of the proposed centralized wash facilities is based on the NPDES permit requirements.

6. PROGRAM FOR RELATED FURNISHINGS AND EQUIPMENT:

Furnishings and equipment are not being furnished from other appropriations that are intended for installation in the proposed facilities.

7. DISPOSAL OF PRESENT ASSETS:

There will be no disposal action resulting from this project.

DD FORM 1391c
1 OCT 70

Page No. 2 of 4

1. DATE 13 JUL 1977	2. FISCAL YEAR 1979	MILITARY CONSTRUCTION PROJECT DATA (Continued)	3. SERVICE, UNIT & INSTALLATION Army Fort Lewis, Washington
4. PROJECT NUMBER T49000		5. PROJECT TITLE Consolidated Vehicle Washing Facilities with Oil and Sediment Pollution Control (Pilot-Project)	
<p>8. <u>SURVIVAL MEASURES:</u> This project is not suitable for inclusion of protective shelters.</p> <p>9. <u>SUMMARY OF ENVIRONMENTAL CONSEQUENCES:</u> This project is for abatement of existing water pollution. Its accomplishment will provide compliance with existing federal and state regulations regarding the point discharge pollution from washracks. Its accomplishment will not complete the program for this station and will not, in itself, provide compliance with existing federal, state and local regulations. The remaining program for water pollution abatement is estimated to cost 1.2 million.</p> <p>10. <u>EVALUATION OF FLOOD HAZARD:</u> These facilities are not sited within areas known to be subject to flooding.</p> <p>11. <u>ECONOMIC SAVINGS:</u> This project is needed for compliance with USEPA water pollution regulations and not actually for economic savings. There are some areas of economic savings associated with reduction in cleaning time enabling more in-field troop training and also substantial reduction in potable water usage.</p> <p>12. <u>UTILITY SUPPORT:</u> No related utility support projects are programmed. Water available for this project is sufficient since there will be reduced water consumption compared to the existing washracks.</p> <p>13. <u>PROTECTION OF THE CULTURAL ENVIRONMENT:</u> This project has been reviewed for historic impact and complies with the intent of PL 89-665 and Executive Order 11593.</p>			
<p>14. <u>PROJECT DEVELOPMENT BROCHURE:</u> The PDB has been completed and is on file in the project file.</p> <p>15. <u>ENERGY REQUIREMENTS APPRAISAL:</u> a. Construct one centralized track and wheel vehicle wash facility, one smaller washrack facility for North Fort, and one commercial-type vehicle wash facility. Tracked facility: one control bldg, 10 exterior and 20 interior wash bays. Adjacent wheeled facility: Ten interior wash bays, two high pressure fixed nozzle exterior wash areas. North Fort facility: Three interior wash bays, two exterior track vehicle wash bays, one high pressure fixed nozzle exterior wash for wheel vehicles. Water runoff to be filtered of solids and oil-approximately 800 water recycled. Commercial type facility connected to sanitary sewer. b. Estimated Energy Consumption: (1) Heating systems - There should be no major heating system needed. The tactical vehicle facility would require a small heating unit for the operator control house. Heating fuel would either be fuel oil or natural gas depending upon economic analysis at time of design. (2) Air conditioning system - None (3) Water supply - There will be a substantial reduction in water consumed by the proposed facilities. Water supply is definitely adequate. (4) Electrical power - Electrical consumption should occur in the following areas: water pumps, agitation pump, sludge pump, sludge auger, miscellaneous security lighting & operating controls. Sufficient electrical power is available near each proposed site. (5) Sewerage system - The tactical vehicle major wash facilities will not be connected to the sanitary sewer. Operator house at the facility will have a lavatory & toilet connected to the septic tank and leach field. Wash water from the Transportation Motor Pool commercial-type facility will enter the sanitary sewer system. (6) Other - None</p>			

DD FORM 1391c

GPO 500-314

Page No. 3 of 4

1. DATE 2 JUL 1977	2. FISCAL YEAR 1977	3. PROJECT NUMBER T49800	4. PROJECT TITLE Consolidated Vehicle Washing Facilities	5. MILITARY CONSTRUCTION PROJECT DATA (Continued)	6. DEPARTMENT Army	7. INSTALLATION Fort Lewis, Washington
------------------------------	-------------------------------	------------------------------------	--	--	------------------------------	--

15. ENERGY REQUIREMENTS APPRAISAL (CONTINUED):	16. PROVISION FOR THE HANDICAPPED:
--	------------------------------------

c. Energy Sources
 (1) Heating - The operator house would be installed with a natural gas or fuel oil heater depending upon economic feasibility at each location.
 (2) Electrical power - Electrical power is available at the location in adequate supply for the centralized wash facility.
 (3) Water supply - Sufficient potable water is available for the facilities.
 (4) Air Conditioning - None.


d. Energy Use Impacts - There will be no energy use impacts on the proposed facilities. Adequate utilities are available for each washrack facility.

e. Energy Conservation - There is a minor increase in consumption, fuel oil or natural gas plus electricity from the proposed project. Pumps and equipment will be chosen and designed to provide the most efficient system. The main area of conservation is in potable water. Use of the tank bath and exterior hose wash should reduce water consumption substantially. Recycling 80% of the wash water should further reduce potable water usage.

f. Energy Alternatives - There are no critical energy sources. No reasonable alternative energy sources are available.

g. Energy effects - There should be no adverse adverse environmental effects created by the chosen energy systems.

h. Basis of Appraisal - Solar energy, total energy and selective energy have been considered for these projects but discarded as not being feasible.


 HOWARD F. STONE
 Brigadier General, USA
 Acting Commander

DATE: 2 July 77

4.2 APPENDIX A

TM 5-800-3

PROJECT DEVELOPMENT BROCHURE

PART I - FUNCTIONAL REQUIREMENTS

NAME OF INSTALLATION: Fort Lewis, Washington

PROJECT TITLE: Consolidated Vehicle Wash Facilities

PROJECT NUMBER: 373

SERIAL NUMBER: L53456F-3354

CATEGORY NUMBER: 831

FISCAL YEAR PROGRAM: 1979

PREPARED BY: Mark T. Masarak

DATE:

PDB-I APPROVED BY:

DATE:

(PROJECT TITLE)

1. FUNCTIONAL DESCRIPTION (Ref. 2-1)

Centralized vehicle wash facilities are of three types: one for tracked-vehicles, one for Army-type wheeled-vehicles, and a commercial-type wheeled-vehicle facility. A centralized tactical vehicle wash facility would consist of a combination of one tracked and one wheeled-vehicle facility is to employed solely for washing non-tactical equipment.

A tracked-vehicle washing facility consists of two major cleaning areas in a drive-through sequence. The first is the interior wash area consisting of twelve wash bays designed in a "toll booth" fashion permitting interior cleaning and refuse removal. The second consisting of six wash bays is the exterior wash area, again designed in a "toll booth" fashion permitting the final washing of the exterior by the crew with hand-held hoses.

The wastewaters from the individual wash areas are collected into one central basin; settled; treated by an oil removal device; retained further in an equalization basin then, subsequently, subjected to intermittent sand filtration. The sludges from the settling operation are to be dried on sand drying beds. Provisions are included to return (recirculate) the effluent water from the sludge drying beds and the intermittent sand filter to the equalization basin. This recirculation scheme could become a full recycle option back to the exterior wash area as future economies dictate.

The Army-type wheeled-vehicle facility consists of two major cleaning areas in a drive-through sequence. The first is a preparation area consisting of twelve wash bays designed in a "toll booth" fashion, to permit interior cleaning, refuse removal, and vehicle preparation for the exterior cleaning which follows. The second area exterior cleaning, is designed as two enclosed, high-pressure, low-volume, drive-through facilities.

The wastewaters collected from the facility described above are centrally settled, treated by an oil removal device, and subjected to intermittent sand filtration. The sludges from the settling operation are sand bed dried. The same sand beds, equalization basin and intermittent sand filter is utilized by this facility and the tracked vehicle wash facility.

The commercial-type wheeled-vehicle facility enclosed, high-pressure, low-volume, drive-through facility with additional cleaning equipment provided for use by sanitation type vehicles. The wastewater collected from this type facility are discharged to the sanitary sewer.

2. INCLOSURES

- a. Current DD Form 1391 (Incl No. 1)
- b. Annotated Approved General Site Plan: N/A
- c. Detail Site Plan: N/A
- d. Definitive Drawing or Standard Drawing, or for special designs include a Single Line Floor Plan N/A
- e. As-Built Drawings for alterations, additions N/A
- f. Existing Utilities Systems Maps (Water, Sanitary Sewer, Storm Drainage, Gas, Electric). Refer to Installation Basic Information Utility Maps.
- g. Conference Notes: N/A

3. GENERAL

- a. The preliminary drawings and outline specifications should include sufficient construction information so that the project can be forwarded for safety review and approval in accordance with applicable safety regulations. Yes
- b. Existing like facilities at other installations have been considered for site adaptation. Those facilities considered adequate for site adaptation are listed as follows: This is a pilot project for tracked and wheeled tactical vehicle washing facilities.

4. CONSTRUCTION CONTRACTOR CONSIDERATIONS (Ref. 2-2.1)

a. Work and Plant Area:

- (1) General Site Plan has been annotated to show contractors work and plant area: Sufficient work area available adjoining centralized wash facility sites.
- (2) Availability of Space for Project Office: N/S/R . Adequate space on site.

b. Borrow Areas, Spoil Areas and Haul Routes:

- (1) General Site Plan annotated to show locations: Maps available of existing utility systems and borrow areas.
- (2) Restrictions on use of areas: N/A

c. Special Security Clearances Required of Construction Contractors: N/S/R

- d. Disposition of Scrap and Salvage: Sanitary landfill
- e. Availability of Utilities to the Construction Contractor:
 - (1) Water: No
 - (2) Electricity: Yes - temporary service
 - (3) Sanitary Sewer: No
 - (4) Gas: No
 - (5) Metering Requirements: Supplied by contractor
 - (6) Total Estimated Cost of Contractors Utilities: \$1,000 for a major site.
 - (7) Method of Billing Contractor for Utilities: Quarterly or monthly
- f. Outage Periods for Tying-In Utilities: N/S/R
- g. Construction Phasing Requirements: N/S/R
- h. Safety: Special considerations for observation by Contractor: N/S/R

5. SITE DEVELOPMENT (Ref. 2-2.2)

- a. Siting Approval:
 - (1) Installation's Master Planning Board Approval of General Site Plan: N/A
 - (2) Installation's Master Planning Board Approval of Detail Site Plan if such plan is required: N/A
 - (3) Additional information: N/A
 - (4) Safety Approval of Site Plan. Verify that Project Complies with All Safety Requirements for Siting, Including a Flood Plain Siting Statement: N/A
 - (5) Latitude Permitted Design Agency in Site Development: N/S/R
Minor alternations permitted.
 - (6) Proposed Future Expansion: N/S/R
- b. Existing Features to be Relocated or Demolished and Availability.
Removal at all water access points at existing washracks.
- c. Site Conditions: Relatively flat terrain - minor earth work.

- d. Orientation: Project developed for compliance with U.S.E.P.A. wastewater discharge standards.
- e. Security Fencing: N/A
- f. Parking, Roads and Railroads:
- (1) Parking Areas: N/A
- (2) Access Streets: N/S/R Reference traffic survey, if available.
- (a) Preferred Location: (1) S.E. of the intersection of East Gate Road and 4th Division Drive. (2) BIO transportation motor pool. (3) North Fort 15th Engineer Branch motor pool area.
- (b) Traffic Category:
1. Types of Vehicle: all types; tracked, tactical wheeled and commercial wheeled.
2. Approximate Percentage of Each Vehicle Type: track vehicle - 40%, wheel vehicle - 60%.
3. Additional information: all vehicles will have a paved road from the wash facility to the cantonment area i.e. their respective shops.
- (c) Special Vehicle:
1. Fork Lifts: no
2. Tanks: yes
3. Other: N/A
4. Approximate Weight of Vehicle: full range of weights is from Jeep type the M88 tracked (360 tons).
5. Additional Information: N/A
- (d) Type of Curb and Gutter Desired: Design to be in accordance with CERL publication E-80.
- (e) Surfacing Desired: Rough concrete
- (f) Traffic Control:
1. Markings. N/A
2. Signs: on facility
3. Signal Lights: N/A

4. Pedestrian Walks: N/A

5. Additional Information: N/A

(g) Sidewalks: N/S/R

(3) Railroads: N/A

g. Landscape Treatment:

(1) Preservation of Existing Landscape Features: adjoining landscape left natural.

(2) Proposed Landscape Planting: N/A

(3) Erosion Control: yes

(4) Lawn Sprinkler System: N/A

(5) Additional Information: N/A

6. EXTERIOR UTILITIES (Ref. 2-2.3)

a. General:

(1) Basic utilities maps: available

(2) Metering requirements: N/S/R
Water and electric meters required.

(3) Additional Information: N/A

b. Water Supply: Required supply for peak demand of 1,000 gpm.

(1) Fire Protection: N/S/R

(2) Industrial Cooling: N/A

(3) Domestic: N/A

(4) Known Deficiencies: Water available 1.2 miles from site (Ft Lewis).

(5) Flow Test Data: N/A

c. Sanitary Sewer: N/A

d. Industrial Liquid Waste: N/A

(1) General Description of Existing System: surface discharge of wash water containing high concentration of suspended solids and grease and oils is ineffectively treated for grease and oils at several storm water discharge points.

(2) Processes Generating Wastes: vehicle washracks

(3) Types of Wastes To Be Treated: high suspended solids and grease and oil content.

e. Solid Waste Disposal:

(1) Special Wastes Developed: sludges from sedimentation chambers and periodic scrapings.

(2) Impact on Installation Procedures: Installation has sufficient capacity.

f. Storm Drainage:

(1) Surface Drainage: all storm waters on hard stand areas of the consolidated washrack facilities will go through the treatment system.

(2) Underground Drainage: detailed layout to be incorporated within the facility, no external system needed.

(3) Additional Information: N/A

g. Fuel: N/A

h. Electrical Exterior:

(1) Existing Exterior Services:

(a) Location: In the vicinity of the proposed construction.

(b) Voltage: 440 volts

(c) Number of Wires: three

(d) Phase of Existing Line: Three Phase

(e) Available Capacity: adequate

(f) Additional Information: N/A

(2) Lighting Exterior:

(a) Intensity: high

- (b) Security: no
- (c) Emergency: no
- (d) Fixture and Switch Location: at 'Butler' type building, wheeled-vehiclewash area.
- (e) Docks: N/A
- (f) Streets: N/A
- (g) Parking Lots: N/A
- (h) Obstruction: N/A
- (i) Warning: N/A
- (j) Traffic Control: N/A
- (k) Additional Information: N/A
- 1. Communications: N/A

7. ARCHITECTURAL AND STRUCTURAL (Ref. 2-2.4)

- a. Floor Plan: Provide a simple functional flow diagram of floor plan showing operations and processes to be performed and their relation to one another.
 - (1) New Design: Design in accordance with CERL Publication E-80.
 - (2) Standard Plan: N/A
 - (3) Site Adaption: see inclosures
- b. Personal Occupancy: N/S/R
- c. Functional and Operational Characteristics:
 - (1) Floors: N/S/R
 - (a) Type of Floor: Concrete
 - (b) Type of Floor Finish: Rough
 - (c) Additional Information: N/A
 - (2) Walls: N/A
 - (a) Exterior Walls: N/A
 - (b) Interior Walls and Partitions: N/A

- (3) Ceilings: N/A
- (4) Windows: N/A
- (5) Doors: N/A
- (6) Hardware: N/A
- (7) Sound Control: N/A
- (8) Storage: N/S/R
- (9) Installed Building Equipment: N/S/R
- (10) Mission Equipment: N/S/R
- (11) Structural Specialties: See CERL Report E-80
- (12) Special Structural Features:
 - (a) Wind Load Criteria: Standard
 - (b) Snow Load Design Criteria: Standard
 - (c) Seismic Design Criteria: Standard
 - (d) Blast and Radiation Design: Standard
 - (e) Blast Design: Standard
 - (f) Special or Unusual Loading, such as Fork Lifts or Wheel Loading and Other Critical Loads on Floor Slabs: Heavy abrasive use from M60 Tank and other track vehicle.
- (13) Fallout Protection: N/A
- (14) Security Features: N/S/R
- (15) Future Expansion: N/A
- (16) Other Special Requirements: N/A

8. MECHANICAL (Ref. 2-2.5)

- (a) Functional and Operational Characteristics:
 - (1) Heating required: yes
 - (2) Air Conditioning required: no
 - (3) Evaporative cooling: no

(4) Heating and cooling source:

Central plant: no

Self-contained plant: yes

(5) Special functional requirements: N/S/R

(b) Indoor Design Conditions:

Heating and ventilation:

Inside design temperatures: Max 65°F

(2) Air Conditioning (N/A) or Evaporative Cooling (N/A)

(3) Refrigeration: N/A

c. Plumbing Fixtures: N/S/R

(1) Emergency showers: N/A

(2) Eyewash fountains: N/A

(3) Special waste systems: N/A

(4) Rough-in for future plumbing: N/A

(5) Required connections to installed building equipment: N/A

d. Specialty Items: N/A

Additional information: See CERL Publication E-80

9. ELECTRICAL, INTERIOR (Ref. 2-2.6)

a. Functional and Operational Characteristics:

(1) Lightning protection required: No

(2) Emergency standby power: No

(3) Electronic shielding: No

(4) Security systems: No

(5) Explosion proof requirements: No

(6) Other special systems: Moisture proof

b. Power Supply:

- (1) Voltages: 440 Volts
- (2) Phases: three phase
- (3) Additional information: N/A

c. Lighting:

- (1) Intensity: Minimal
- (2) Fluorescent: preferred less consumption
- (3) Incandescent: N/A
- (4) Recess: N/S/R
- (5) Surface or Pendant Mounted Fixtures: N/A
- (6) Night Lighting: yes
- (7) Emergency and Protective Lighting: N/A
- (8) Special receptacles: N/A
- (9) Additional Information: N/A

d. Communication, Telephone, Intercom, Antenna Systems, Closed-Circuit Television:

N/S/R. Equipment List inclosed: No

- (1) Number: 1 at Main Fort Site, 1 at North Fort Site.
- (2) Type: Telephone
- (3) Location: Operator Booths
- (4) Number of Outside Lines: 1
- (5) Additional Information: N/A

e. Specialty Items: N/A

10. FIRE PROTECTION (Ref. 2-2.7)

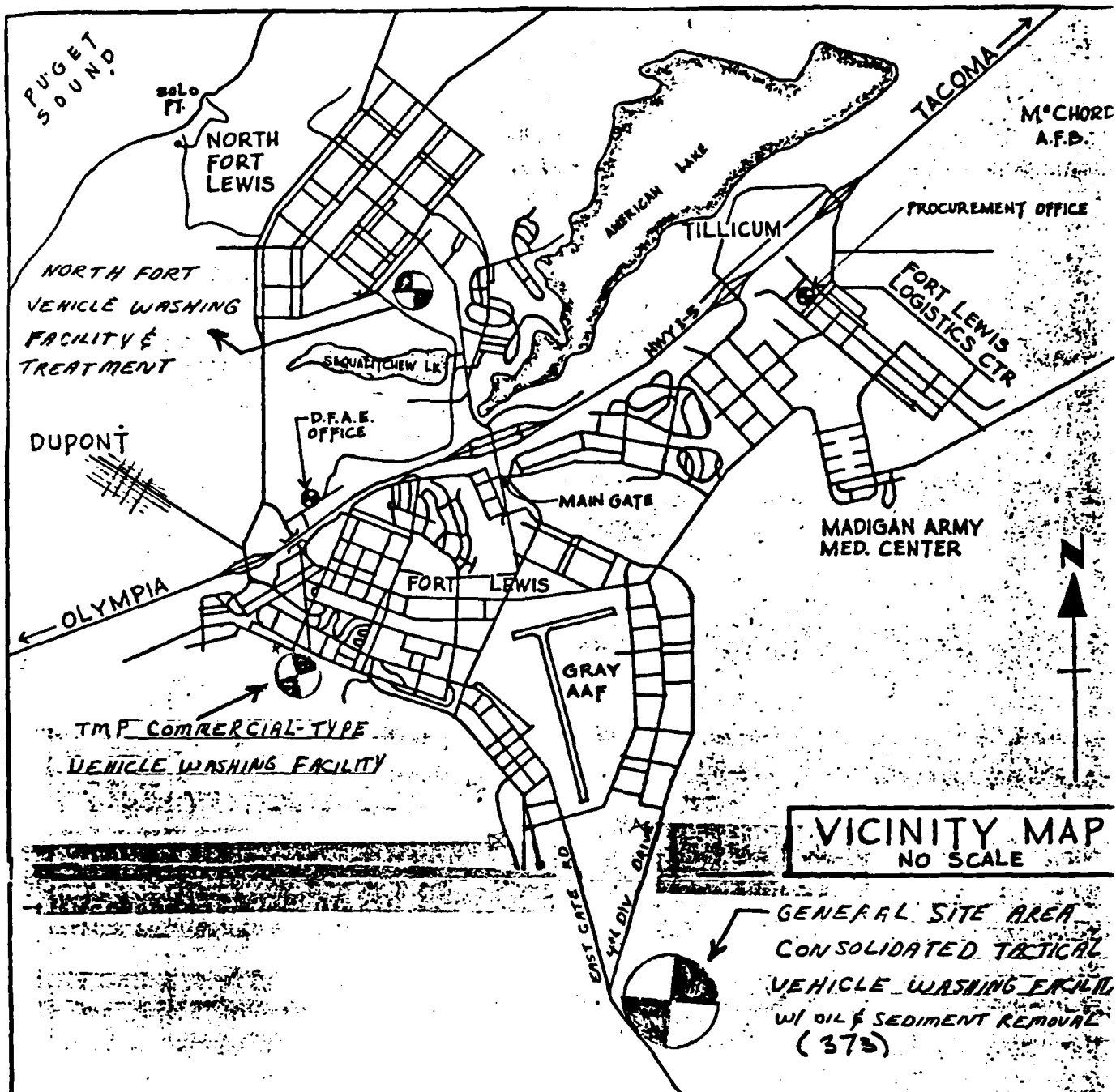
a. Sprinkler System: N/S/R

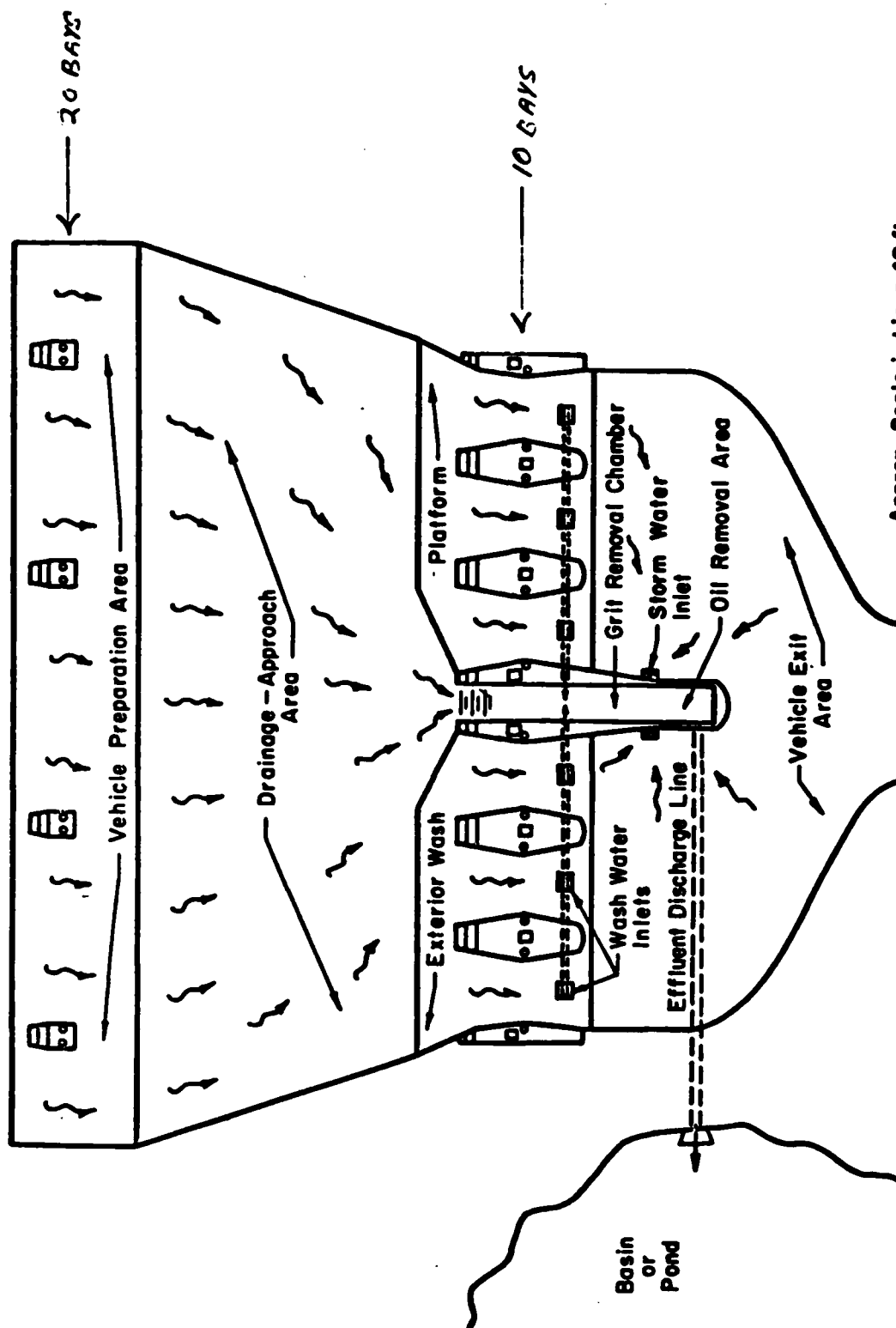
b. Alarms: N/A

- c. Detection Systems: N/A
- d. Special Fire Suppression System: N/A
Carbon dioxide: Several extinguishers on site.

11. SPECIAL CONSIDERATIONS (Ref. 2-2.8)

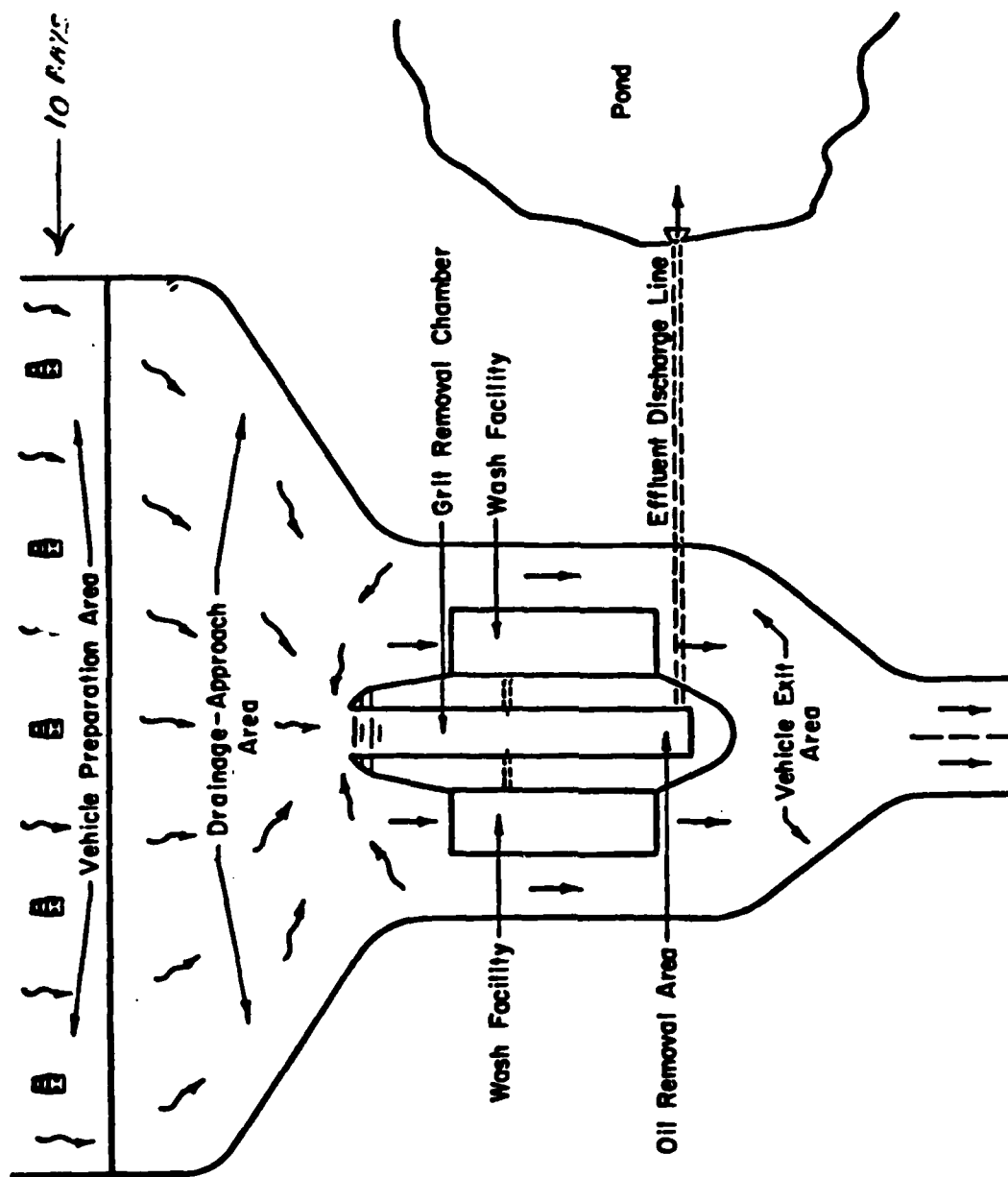
- a. Service Contracts with Utility Companies: N/A
- b. Studies and Investigations Required: N/S/R
- c. Application of Special Design Criteria: N/S/R
See CERL Publication E-80
- d. Channels for Procuring Special Detailed Criteria: N/S/R
- e. Special Approval Requirements: N/S/R
- f. Requirements for Operating Manual: Needed for each wasing facility site.
- g. Requirements for Training Using Service Operating Personnel
(Utility Plants, Special Equipment, etc.) N/S/R
- h. Contributions of Nonappropriated Funds: N/A
- i. Real Estate Requirements: Right-of-Entry - Permits, Acquisitions
and/or Disposals: N/A
- j. Environmental Assessment and Environmental Impact Statement: N/S/R
An Environmental Assessment is being prepared for the project.
- k. Supplemental Data: N/S/R See CERL Publication E-80.





MAIN FORT - Tracked vehicle wash area.

373
Project # I-448



MAIN FORT - Wheel vehicle wash area.

5.0 PRODUCTION BENEFITS

5.1 Military Manpower Analysis, Central Vehicle Wash Facilities, Fort Polk, Louisiana (Kelley)

5.1 MILITARY MANPOWER ANALYSIS
CENTRAL VEHICLE WASH FACILITIES
FORT POLK, LOUISIANA

PREPARED BY: JIM V. KELLEY
DAC, General Engineer

MASTER PLANNING
ENGINEERING AND HOUSING

OBJECTIVE: Determine the total average military man.years of productive effort saved by utilizing Central Vehicle Wash Facilities (CVWF) for the removal of exterior sediment from tactical vehicles as compared to utilization of conventional washracks.

ASSUMPTIONS:

1. All exterior sediment removal from tactical vehicles and equipment is accomplished at the CVWF.
2. Average washing time for tracked vehicles at a conventional washrack is 7.50 man.hours;
 - does not include waiting time to gain access to wash platform
 - does not include clean-up time after wash action is completed
 - assumes a crew of two conducting wash activities (3.75 man.hours X 2 men) = 7.50 man.hours.
3. Average washing time for wheeled vehicles at a conventional washrack 2.50 man.hours;
 - does not include waiting time to gain access to wash platform
 - does not include clean-up time after wash action is completed
 - assumes a crew of one conducting wash activities
4. Average washing time for tracked vehicles at the CVWF equals 0.91 man.hours/Veh;
 - based on four (4) personnel operating water cannon positions (4 men X 0.17 man.hours) = 0.68 man.hours
 - based on one (1) vehicle operator = 0.17 man.hours
 - based on one (1) wash coordinator directing three (3) wash lanes simultaneously (0.17 man.hours)/(3) = 0.06 man.hours
 - Total = (0.68 + 0.17 + 0.06) man.hours = 0.91 man.hours
 - does not include scheduling of CVWF
 - does not include clean-up time after wash action is completed.

MILITARY MANPOWER ANALYSIS
CENTRAL VEHICLE WASH FACILITIES
FORT POLK, LOUISIANA

5. Average washing time for wheeled vehicles at the CVWF equals 0.53 man.hours/vehicle
 - based on four (4) personnel operating water cannon positions (4 men X 0.10 man.hours) = 0.40 man.hours
 - based on one (1) vehicle operator = 0.10 man.hours
 - based on one (1) wash coordinator directing three (3) wash lanes simultaneously (0.10 man.hours)/(3) = 0.03 man.hours
 - Total = (0.40 + 0.10 + 0.03) = 0.53 man.hours/vehicle
 - does not include scheduling of CVWF
 - does not include clean up time after wash action is completed
6. Total number of wheeled tactical and garrison vehicles including trailers for a Mechanized Infantry Division (minus one maneuver brigade) is 6,960 vehicles.
7. Total number of tracked tactical and garrison vehicles and equipment for a Mechanized Infantry Division (minus one maneuver brigade) is 1,240 vehicles.
8. Average number of wash cycles per vehicle per year at 16 cycles;
 - based on projected gunnery requirements to satisfy weapons qualification;
 - based on projected training exercises, ARTEP's, FTX's, JRX's, etc.
 - includes unscheduled activities that require vehicle washing.
 - does not include National Training Center deployment exercises (NTC has wash capability)
9. Does not include National Guard nor Reserve Component man.year savings. Does not include NG/RC vehicles and equipment.
10. Military man.year equals 1800 man.hours/year.
 - based on (150 man.hours/month X 12 months) = 1800 man.hours/year
 - no differentiation between grade structures
 - all MOSC's are involved in vehicle washing.

MILITARY MANPOWER ANALYSIS
CENTRAL VEHICLE WASH FACILITIES
FORT POLK, LOUISIANA

CALCULATIONS:

1. WHEELED VEHICLES (WV):

a. $(6960 \text{ WV}) \times (16 \text{ cycles/WV}) = 111360 \text{ WV wash cycles/year}$

b. Conventional Washrack:

$(111360 \text{ WV wash cycles/Yr} \times 2.5 \text{ man.hours/cycle}) = 278400 \text{ man.hours/year}$

Many years of effort equals:

$(278400 \text{ man.hours/year}) / (1800 \text{ man.hours/man year}) = 154.67 \text{ man years}$

c. CVWF:

$(111360 \text{ WV wash cycles/year} \times 0.53 \text{ man.hours/cycle}) = 59021 \text{ man.hours/year}$

Many years of effort equals:

$(59021 \text{ man.hours/year}) / (1800 \text{ man.hours/man years}) = 32.79 \text{ man years}$

d. Net savings for wheeled vehicles:

$(154.67 \text{ man.years} - 32.79 \text{ man.years}) = 121.88 \text{ man.years.}$

2. TRACKED VEHICLES (TV):

a. $(1240 \text{ TV}) \times (16 \text{ cycles/TV}) = 19840 \text{ TV wash cycles/year}$

b. Conventional washrack:

$(19840 \text{ TV wash cycles/year} \times 7.5 \text{ man.hours/cycle}) = 148800 \text{ man.hours/year}$

Man.years of effort equals:

$(148800 \text{ man.hours/year}) / (1800 \text{ man.hours/man.year}) = 82.67 \text{ man. years}$

MILITARY MANPOWER ANALYSIS
CENTRAL VEHICLE WASH FACILITIES
FORT POLK, LOUISIANA

c. CVWF:

$(19840 \text{ TV wash cycles/year} \times 0.91 \text{ man.hours/cycle}) = 18054 \text{ man.hours/year}$

Many years of effort equals:

$(18054 \text{ man.hours/year}) / (1,800 \text{ man.hours/man.years}) = 10.03 \text{ man.years}$

d. Net Savings for Tracked Vehicles:

$(82.67 \text{ man.years} - 10.03 \text{ man.years}) = 72.64 \text{ man.years}$

3. Recapitulation of Net Man-Year Savings Utilizing CVWF in lieu of conventional washracks:

a. Wheeled vehicles - 121.88 man.years

b. Tracked vehicles = 82.64 man.years

c. Total Savings = 194.52 man.years

CONCLUSION:

1. Removal of exterior sediment from tactical wheeled vehicles utilizing CVWF represents an average man.year savings at 79% of the available productive effort.

2. Removal of exterior sediment from tactical tracked vehicles utilizing CVWF represents an average man.year savings at 88% of the available productive efforts.

6.0 OCCUPATIONAL AND ENVIRONMENTAL BENEFITS

- 6.1 Videotape Transcript, Vehicle Wash and Maintenance Facilities (U.S. Army Construction Engineering Research Laboratory, 1983).

6.1 Videotape Transcript

THE MAINTENANCE FACILITY POLLUTION ABATEMENT TEAM U.S. ARMY CONSTRUCTION ENGINEERING RESEARCH LABORATORY PRESENTS VEHICLE WASH AND MAINTENANCE FACILITIES

As long as armies have been in the field, dust, dirt, and mud have been a problem. This has never been more true than today. If modern vehicles are to be kept in reliable, operational condition, they require cleaning as well as scheduled and unscheduled maintenance. We will show how some army units approach the problem of cleaning and maintaining their vehicles and point out some of the problems with current procedures: time spent which could be used for training or other activities, wasted potable water, and difficult pollution problems. We will propose a general strategy for reducing the time needed to wash vehicles, improve the quality of training, provide a more logical setting for standard maintenance procedures and reduce the enormous problems associated with wastewater treatment and control. It should be pointed out that there is no universal solution to these problems. Each installation has unique site characteristics such as soils, climate, and missions that must be considered. We're advocating a strategy, the application of which must be tailored to each specific installation.

Tactical vehicles operating in the field get dirty. How dirty? That depends on field conditions. Obviously, a vehicle will pick up more dirt operating in mud than on a dry surface. But under average soiling conditions an M-60 tank can pick up as much as half a ton of dirt in the course of a field training exercise. An armored battalion might accumulate enough dirt to fill seven 2½-ton dump trucks. Contrast this with the dirt on an automobile going through a commercial car wash and you get some idea of the scope of the problem.

Special techniques are needed to remove dirt from tactical vehicles. In most installations there are a number of vehicle wash stations located in or adjacent to maintenance facilities and motor pools. Seldom are there enough hoses or outlets for washing the incoming vehicles. A lot of time is wasted waiting for a serviceable hose or outlet. Often the driver must provide his own hose or check one out from his unit maintenance shop. In addition, various tools are sometimes used to dig dirt out of tracks and remove dirt from under tank skirts and fenders.

Because vehicle crews perform preventative maintenance at the wash station, oil is spilled or drained onto the hard stand and carried into the wastewater system. Crews will also use detergents and solvents to clean oily engines and compartments. Cleaning aids in combination with grease and oils pollute the large quantities of water used for exterior washing and make the treatment more complex and difficult.

At the typical army installation there are a number of small vehicle wash stations. Each station may have some rudimentary pollution control such as a small grit chamber that requires frequent cleaning, and a gravity oil separator with no removal or storage capacity. But these controls are rarely adequate to the task. Wash water carrying dirt, detergents, and oils ends up in either the sanitary or storm collection system. These systems are not normally designed to handle the solids or hydraulic loading produced at the wash stations. In addition, the sewage treatment plants probably have not been designed to handle the increased loading. If the wash water drains into a storm sewer or channel, the contaminants will pollute the environment. Finally, most wash stations use water from the installation's potable water supply. Drinking water is not needed to wash vehicles and the treatment costs are wasted.

At the Army's Construction Engineering Research Laboratory we've been investigating these problems since 1975. We in the Office of the Chief of Engineers advocate separating facilities for exterior vehicle wash on the one hand, and performing maintenance on the other, since each has different requirements in different waste streams. At the same time we advocate consolidation of similar activities that produce waste streams. That is, vehicle exterior wash facilities should be consolidated but at a different location from maintenance facilities. Consolidation makes it possible to incorporate design concepts and equipment better suited to specific washing or maintenance activities. Also by consolidating these operations in designated locations, the appropriate wastewater treatment operations can be sized and placed where they will be most effective.

The concept of using separate centralized exterior wash and maintenance facilities was first implemented at Fort Lewis, Washington. At Fort Lewis two exterior wash facilities were constructed near the cantonment boundary adjacent to trails connecting the training areas and tactical maintenance shops and motor pools. The wash facilities have hose towers for exterior washing. The hose towers were designed and constructed so two people can use the hoses from adjacent towers to wash a vehicle simultaneously. The recommended water pressure and flow rate range from 70 to 110 pounds per square inch, and 15 to 30 gallons per minute. The exterior wash facility is designed for extremely efficient and cost-effective handling of water. Each central wash facility has a wastewater treatment and recycling system.

Most of the oils and solids are separated and removed at the primary treatment basin. A rope oil skimmer is used to remove the floating oil from the surface of the basin for storage in an adjacent tank. The basin is drained periodically to remove the solids with a front-end loader. An equalization basin provides storage to equalize the flow from the primary treatment basin to the intermittent sand filters which polish the wash water for reuse. After leaving the sand filters clean water is stored in a detention basin for reuse at the hose towers. Recycling the wash water reduces the demand for potable water at the exterior wash operations. There are distinct economic advantages to using recycled water instead of potable water as much as possible to supply washing operations.

Implicit in the concept of consolidated wash facilities is the parallel development of modern maintenance facilities. Rather than perform maintenance on the wash rack hard stand, every effort should be made to provide areas which facilitate maintenance work on vehicles and minimize the environmental impact of this work.

The first step in establishing a good maintenance area is to house it in a building in the cantonment area. Or if that is not possible, at least under a roof which will prevent oil and grease from mixing with storm water. Each maintenance area should contain a pit to provide access to the underside of vehicles. A waste oil collection system should be installed in the pit to collect the waste oil from vehicles and place it directly into a storage tank. To eliminate the need for detergents and maintenance cleaning, low volume, high pressure, hot water washers can be used. Experience has shown the hot water systems are much more efficient and effective than steam. The flow rate and water pressure for the hot water washers must not exceed 5 gallons per minute and 800 pounds per square inch at the washer. The water temperature must be maintained between 120° to 140° F for effective, safe cleaning. The low flow characteristics of the hot water washer facilitate the use of a passive system as pretreatment to remove the free oils in suspended solids from the wash water prior to discharge into a sanitary sewer. No exterior washing should be performed at the maintenance areas since the pretreatment systems are not designed to handle heavy solids loading. The lift requirements of maintenance crews also must be considered. Vehicle maintenance areas should be equipped with XY directional overhead cranes capable of removing and transporting tank hatches and engine packs. The minimum recommended lift capability for such a crane is 7½ tons. POL storage areas should be curbed and covered by a roof to contain oil spills and prevent mixing with storm water.

Unit commanders indicate troop morale has improved significantly since the new wash and maintenance facilities were opened at Fort Lewis.

Troops call the two central exterior wash facilities which opened at Fort Polk in 1982 "bird baths". They were designed to wash the exterior of track vehicles. The bird baths include a tank bath prewash with water cannon and finishing wash stations where the remaining soil, if any, is removed. The tank bath prewash is ideally suited to efficient water use. A prewash basin can be used in several ways depending on the vehicle being washed, the degree of soiling and the need perceived by the users. The bottom of the basin contains a series of cylindrical bumps specifically designed to flex the running gear of the vehicles and dislodge dirt. Some commanders run their M-60 tanks and APCs through a dry basin and use the four water cannons to wash the dirt off the vehicles. The water level in the basin can be adjusted to loosen and remove dirt packed under the skirts and fenders of the Abrams tank effectively and safely. Water cannon operators must be instructed not to direct the water stream from the cannon toward or into the air intakes or exhaust vents of the Abrams tank. The tank bath prewash is ideally suited to installations having heavy soiling conditions. The basin soak and cannon remove a large percentage of the dirt from vehicles.

The time any particular vehicle stands in the basin will vary, but rarely would exceed ten minutes. When the vehicle exits the prewash it's inspected. If additional washing is required, it's sent on to a finishing station. Seldom does this finish wash take more than 20 minutes. The prewash basin is specifically designed for track vehicles and has large cylindrical bumps built into the bottom. Because wheeled vehicles can be damaged by these bumps, their use of the tank prewash in its current form is awkward and time-consuming. Studies are now underway to determine the design criteria for constructing basins for wheeled vehicles.

The consolidated wash facility provides the opportunity for extremely efficient and cost-effective handling of wash water. Separation of exterior wash and maintenance facilities keeps the oil's contamination of the wastewater from the exterior wash as well as possible. Recycling wash water instead of routing it in the sanitary sewers eliminates the need to consider vehicle washing operations when designing sewage treatment plants. The treatment to remove oils and solids would be an important concern, but the increased flow created periodically by exterior wash activities could also cause problems if the water were not recycled.

Maintenance cleaning at the new facilities produces relatively low flow rates but wastewater that has a very high oils content. Simple processes can be used to treat these wastes as long as flow rates are low. Exterior wash activities create large quantities of wastewater that are high in solids but low in oils. Maintenance cleaning produces a relatively small amount of wastewater very high in oils but low in solids. By separating exterior wash and maintenance operations we can deal with each problem separately and efficiently. Furthermore, by consolidating exterior wash activities at one or two centralized locations we can achieve economies of scale in the design, installation, and operation of wastewater treatment systems. It's not economically feasible to build water pollution control systems at each of the many isolated wash stations now in use on installations.

In conclusion, the concept of the consolidated exterior wash facility significantly reduces or eliminates a number of problems resulting from vehicle washing activities. The time spent washing vehicles is reduced 80%, allowing more time for training or other activities. Demands placed on the potable water supply are reduced 90% by recycling the wash water. Environmental pollution is eliminated by on-site control and treatment of wastewater from washing activities. Providing crews with a separate, logical setting for vehicle maintenance protected from the elements with provisions for engine removal, waste oil recovery, and hot water cleaning improves morale and efficiency. Consolidating exterior wash facilities and providing separate, modern, maintenance facilities saves time, money, and effort, while improving troop morale and preserving a clean environment.

For additional information please contact the Maintenance Facility Pollution Abatement Team at the U.S. Army Construction Engineering Research Laboratory, P.O. Box 4005, Champaign, Illinois 61820. Or call Joe Matherly or Jerry Benson at the lab, area code (217) 352-6511 or FTS 958-7011.

7.0 DEMONSTRATIONS AND TOURS

(Refer to Workshop Location Map 2)

- 7.1 DuPont Stormwater Outfall Treatment Facility
- 7.2 Transportation Motor Pool (TMP) Vehicle Washing Facility
- 7.3 Southwest Wash Racks (southwest of Gray Army Airfield)
- 7.4 Southeast Wash Racks (southeast of Gray Army Airfield)
- 7.5 Scheduled Maintenance Facilities (troop unit motor pool locations)

Tracked Vehicles
Wheeled Vehicles

- 7.6 North Fort Wash Racks
- 7.7 Wastewater Treatment Plant
- 7.8 Fort Lewis Military Museum (conference room location)
- 7.9 Site Preparation for New Madigan Army General Hospital
- 7.10 Fort Lewis Family Housing
- 7.11 Roller Compacted Concrete Test Strip

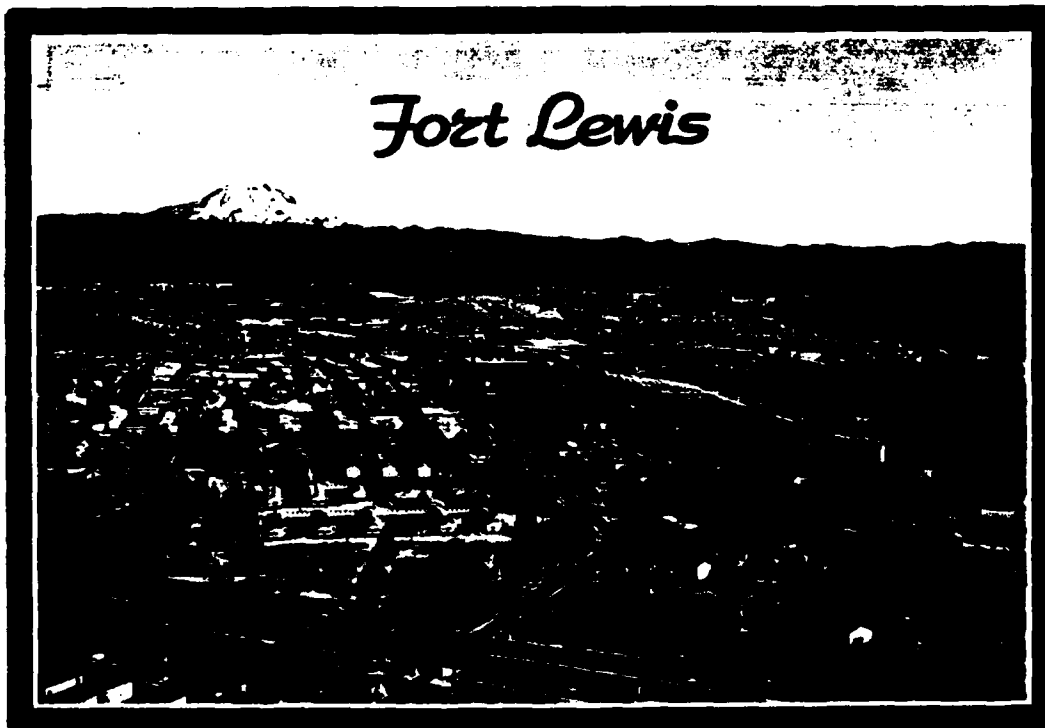
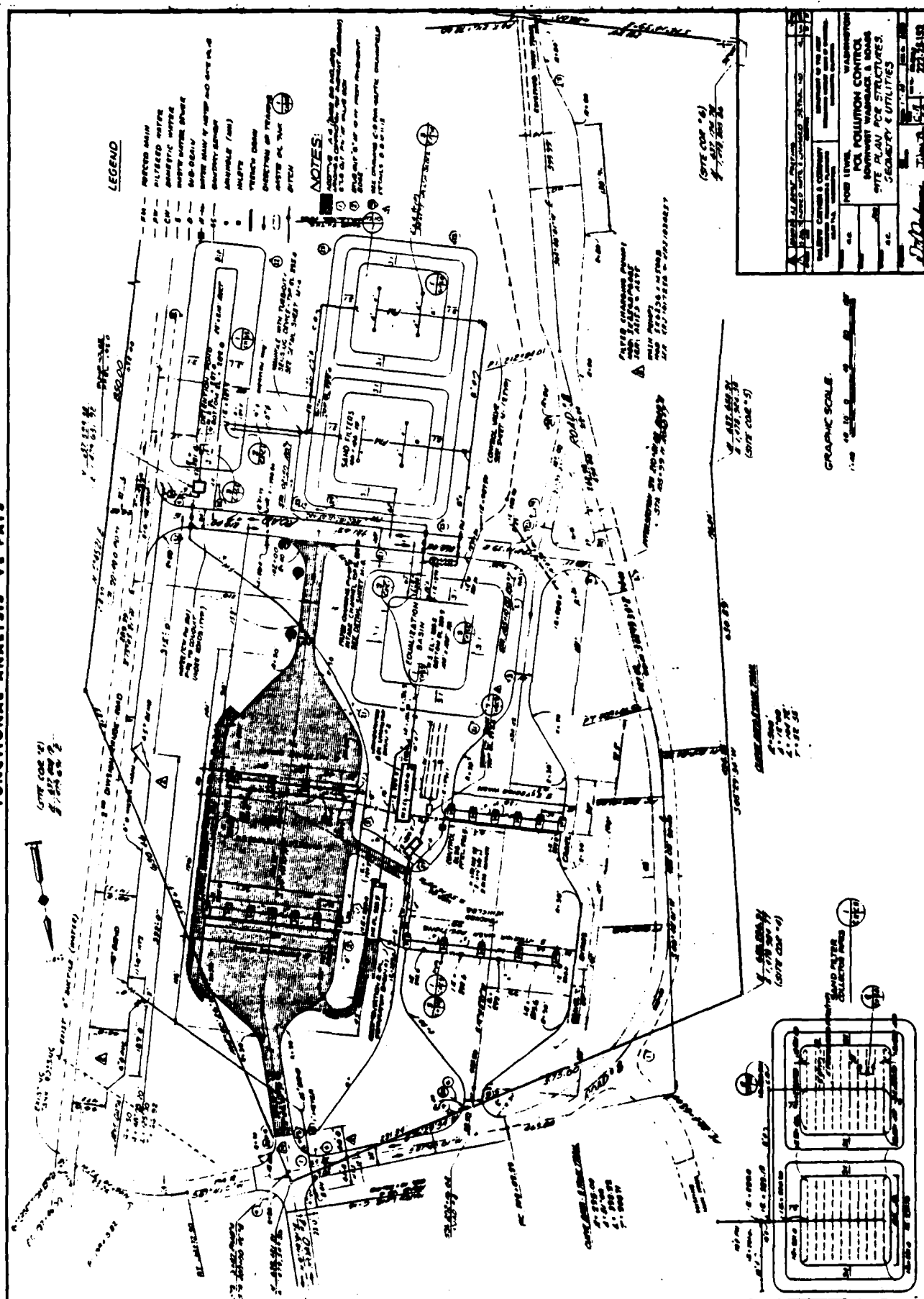


Table 7.1 SELECTED DRAWINGS OF FACILITIES

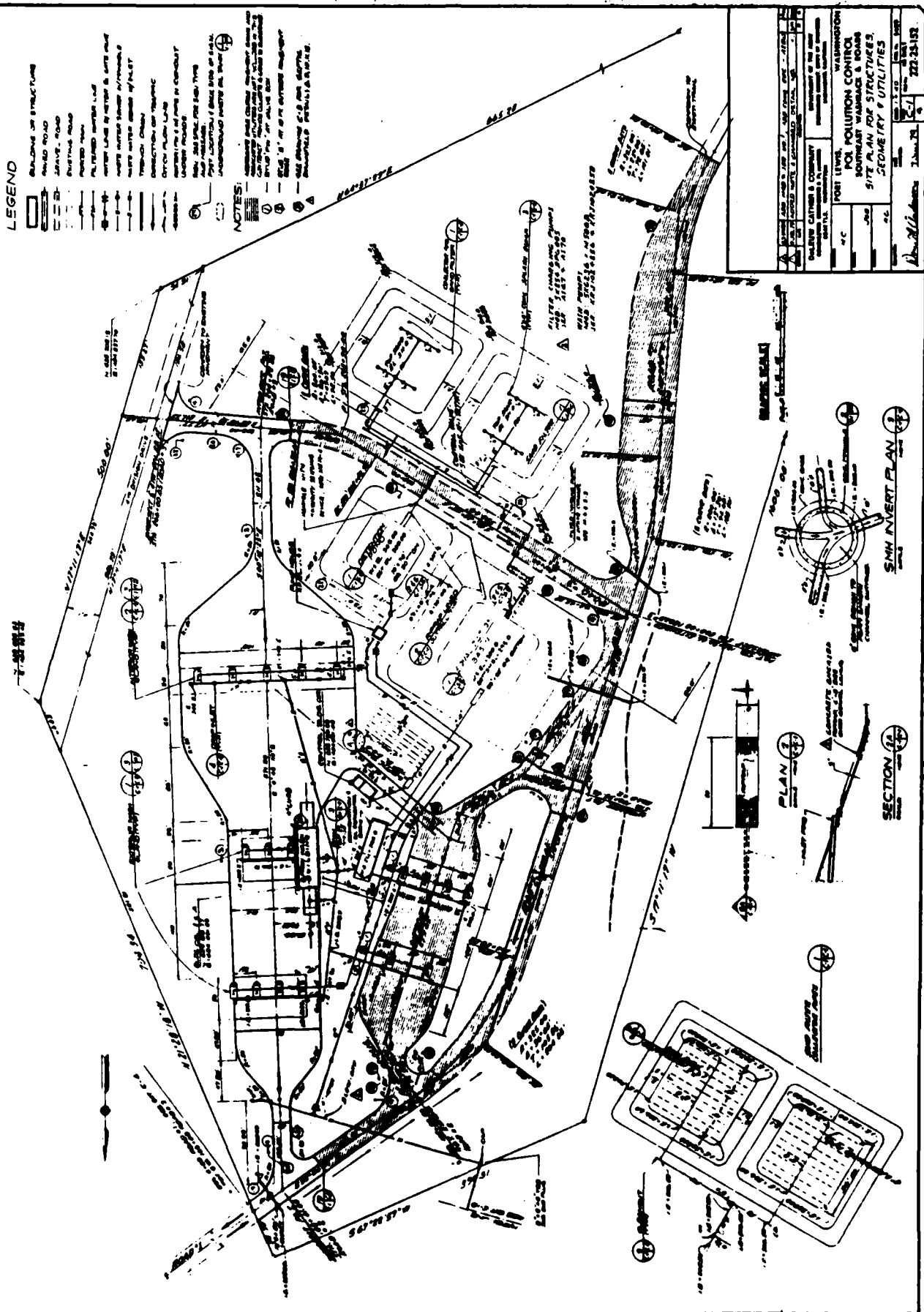
<u>Figure</u>	<u>Drawing</u>	<u>Title</u>
1	C-11	Southwest Washrack & Roads, Site Plan for Structures, Geometry & Utilities
2	C-1	Southeast Washrack & Roads, Site Plan for Structures, Geometry & Utilities
3	L-1	Southeast Washrack & Roads, Site Landscaping Plan
4	C-14	North Fort Washrack & Roads, Site Plan, Paving & Utilities, Sections & Details
5	M-1	Vehicle Wash Tower, Trench Wash Down & Booster Pump Details
6	C-9	Wash Rack Island & Septic Tank Details
7	S-4	Southeast, Southwest & North Fort Washracks, Sedimentation Basin, Oil/Water Separator Plans, Sections & Details
8	S-5	Southeast & Southwest Washracks, Equalization & Detention Basins, Section & Details
9	M-6	Southwest & Southeast Washracks, Filter Charging Pumps & Misc. Details
10	S-6	Southeast & Southwest Washracks, Sand Filter Section & Details
11	M-1	Water Recycle System Flow and Control Diagrams
12	M-4	Southeast & Southwest Washrack, Control Building & Sampling/Diversion Manhole
13	S-2	Transportation Motor Pool Washrack, Washer Building Foundation Plan, Sections & Details
14	A-1	Vehicle Maintenance Shop, Key Floor Plan
15	A-6	Vehicle Maintenance Shop, Partial Floor Plan - SMF Bay
16	M-8	Vehicle Maintenance Shop, Plumbing Grids 9-14
17		Wastewater Treatment Plant, Site Plan and Flow Diagram

FUNCTIONAL ANALYSIS - VB PAYS

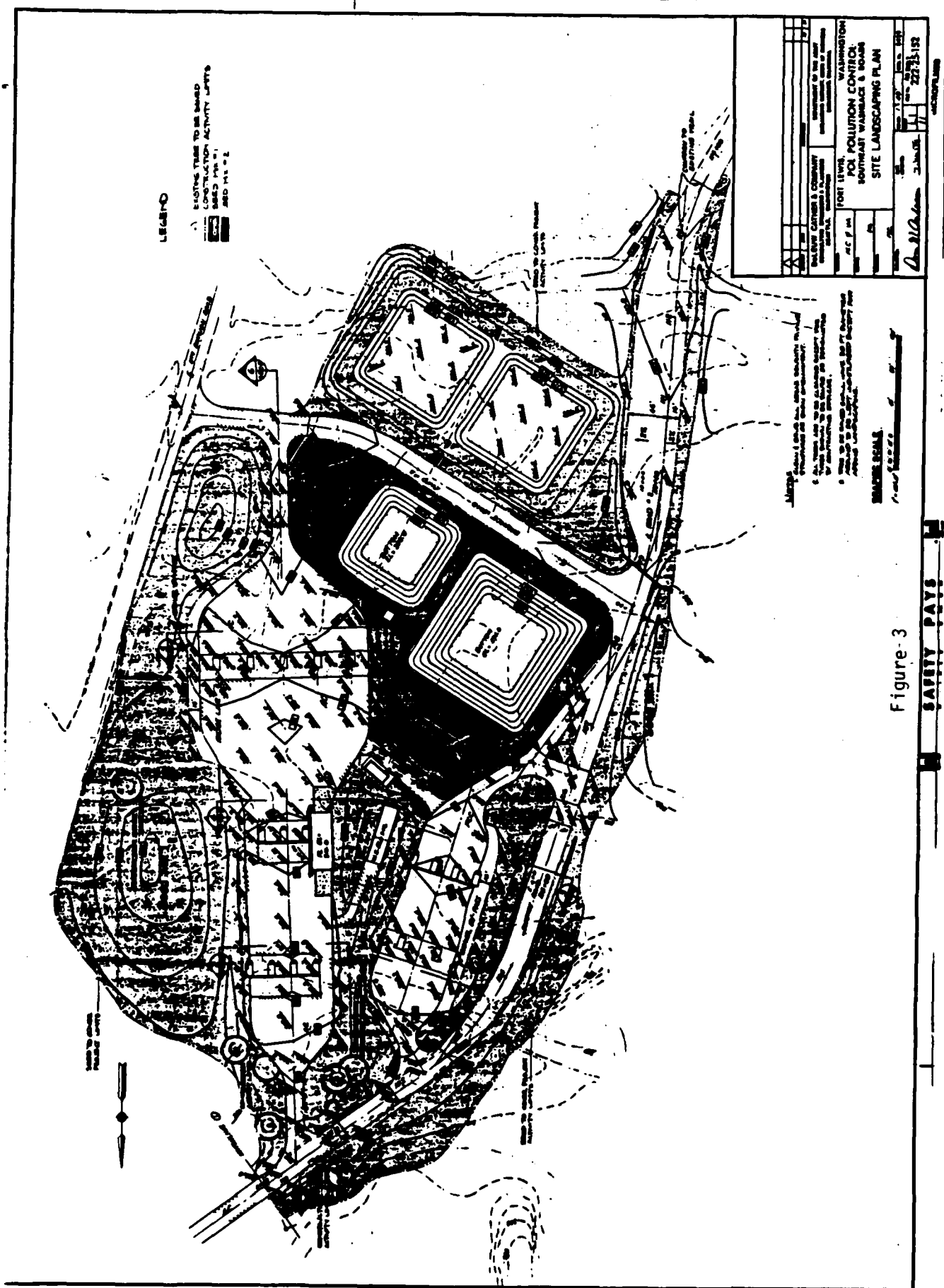


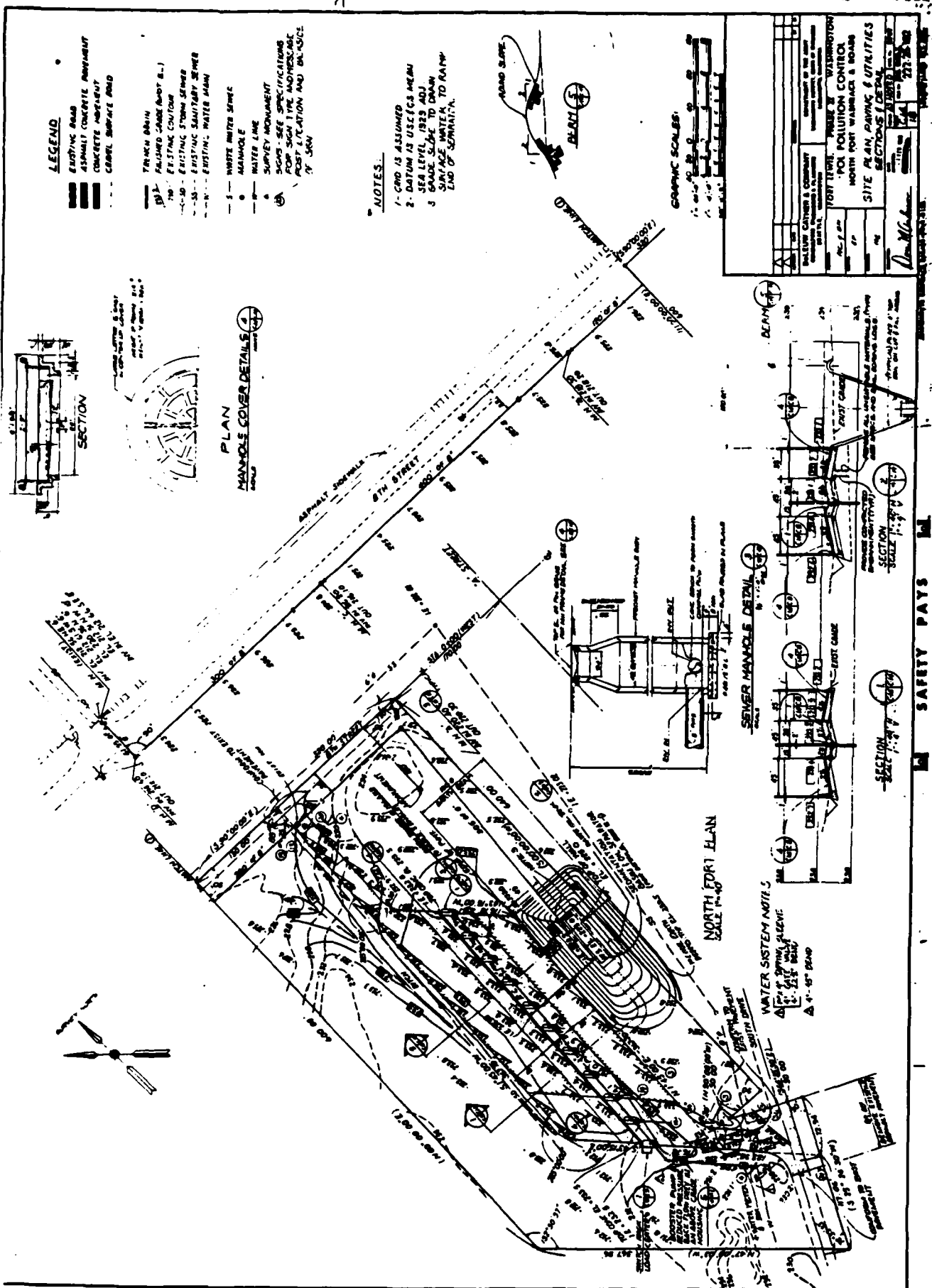
SAFETY PAYS
Figure 1

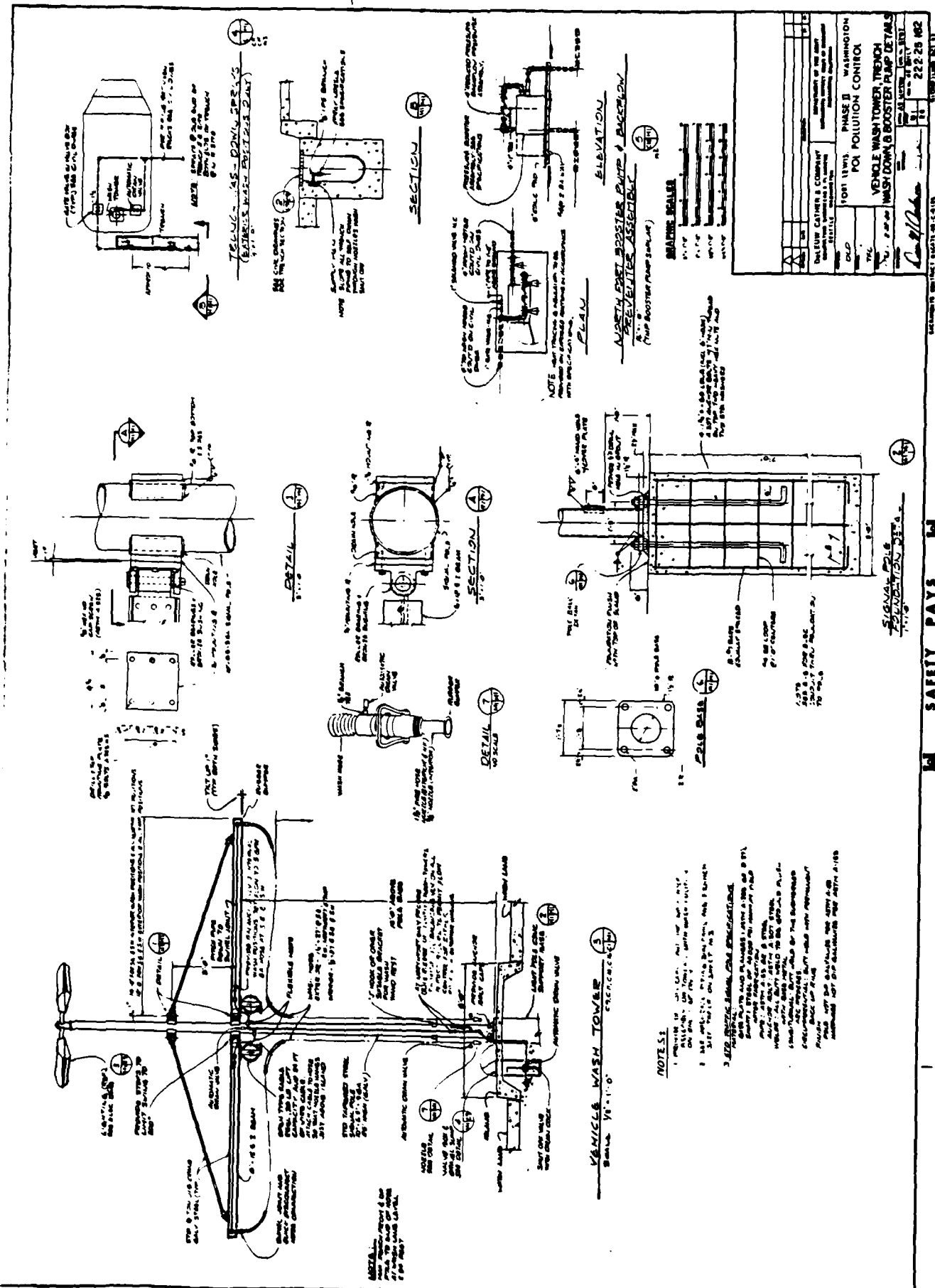
LEGEND

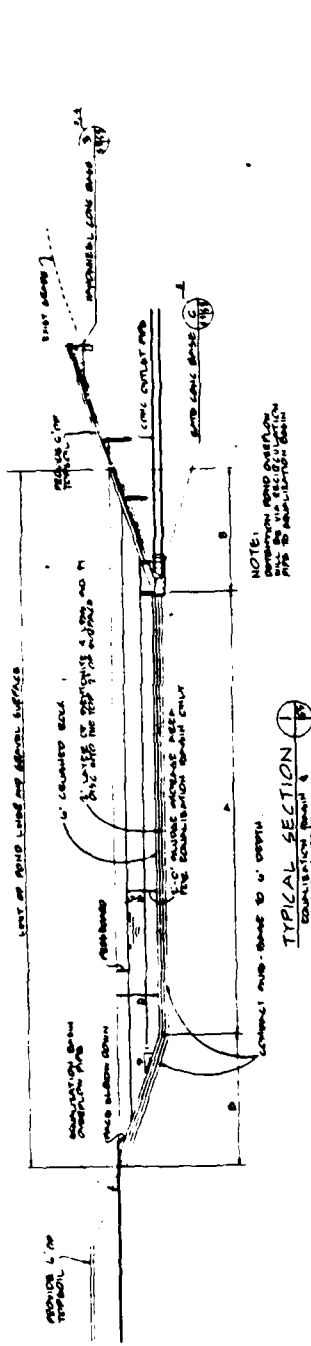


SAFETY PAYS **IN**
Figure 2

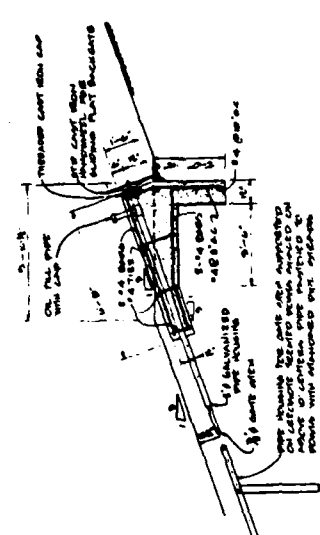
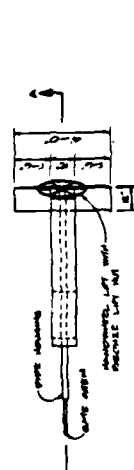




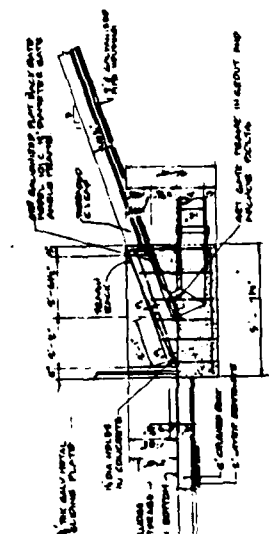
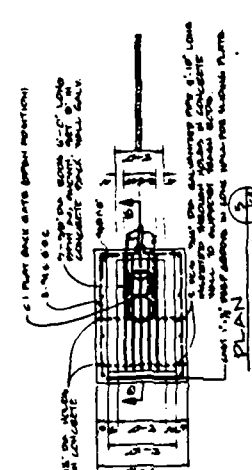




TYPE	LOCATION	SECTION	SPACING	AREA	VOLUME	WEIGHT	UNIT PRICE	TOTAL
CONCRETE	ABUTMENT	1	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	PIER	2	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	ABUTMENT	3	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	PIER	4	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	ABUTMENT	5	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	PIER	6	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	ABUTMENT	7	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	PIER	8	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	ABUTMENT	9	15.0	11,100	11,100	11,100	\$1.00	\$11,100
CONCRETE	PIER	10	15.0	11,100	11,100	11,100	\$1.00	\$11,100

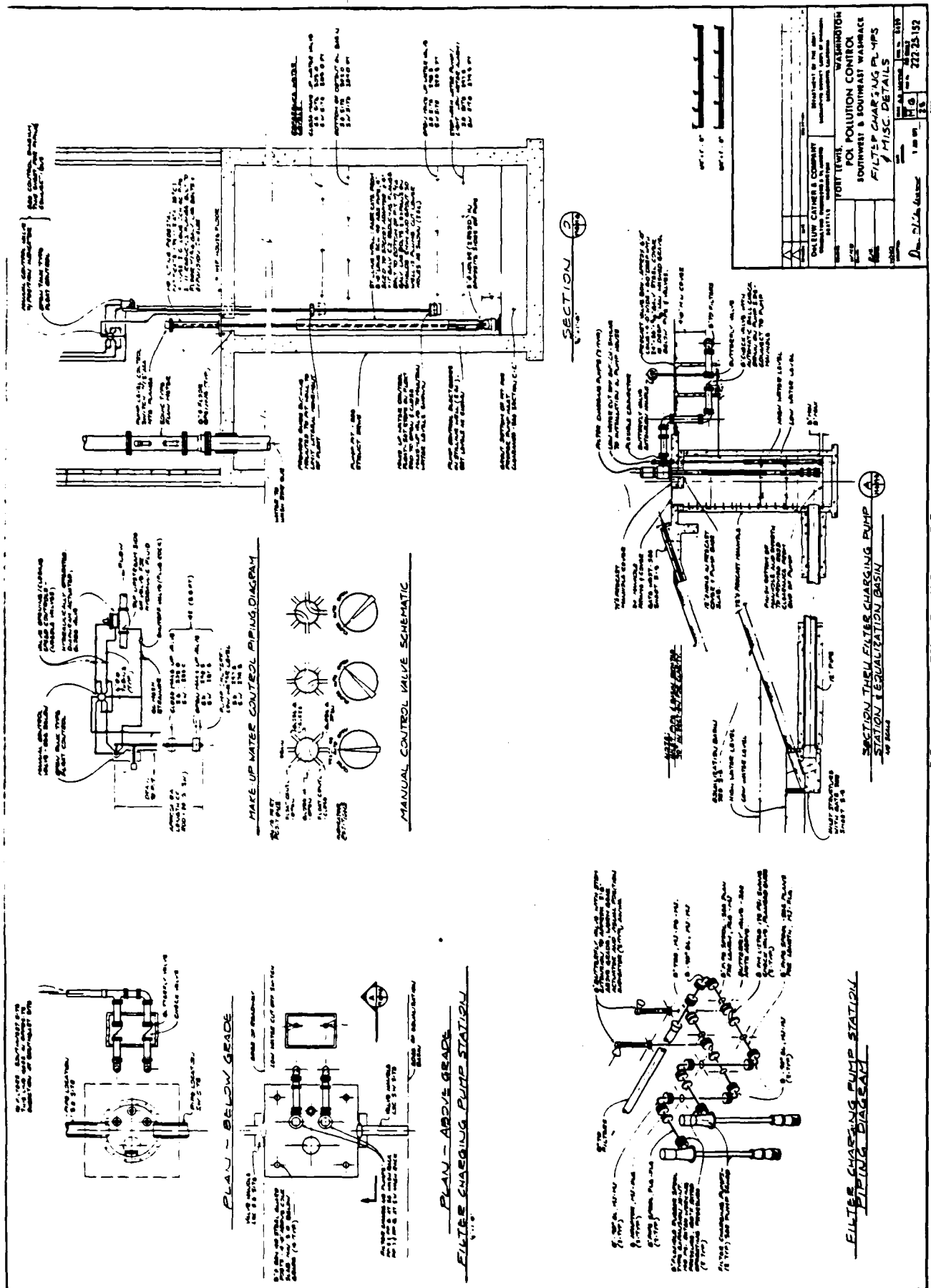


SECTION A-A
SCALE 1/4" = 1'-0"



SECTION B-B
SCALE 1/4" = 1'-0"

PROJECT NO. 100-100		DATE 10/1/60	
SHEET NO. 100-100		SCALE 1/4" = 1'-0"	
DESIGNED BY 100-100		CHECKED BY 100-100	
APPROVED BY 100-100		DATE 10/1/60	
PROJECT NAME 100-100		LOCATION 100-100	
PROJECT NO. 100-100		DATE 10/1/60	
SHEET NO. 100-100		SCALE 1/4" = 1'-0"	
DESIGNED BY 100-100		CHECKED BY 100-100	
APPROVED BY 100-100		DATE 10/1/60	



SAFETY PAYS

Figure 9

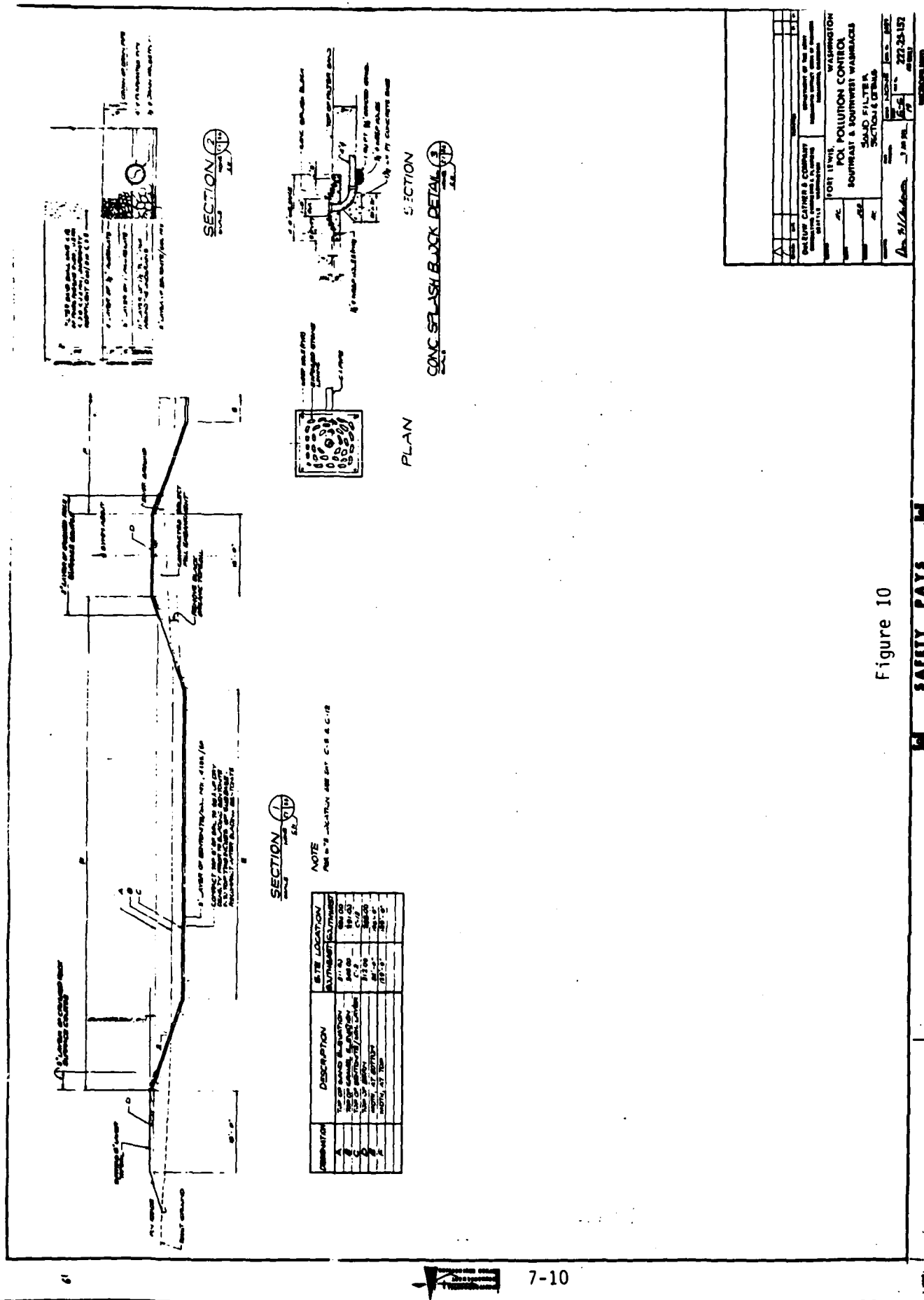
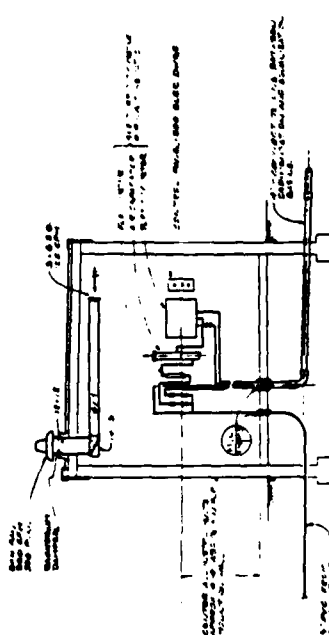
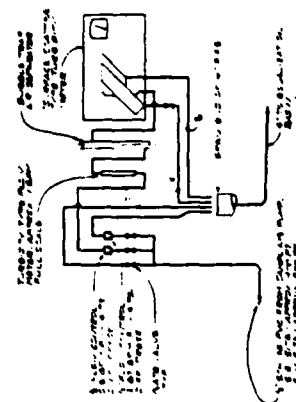


Figure 10





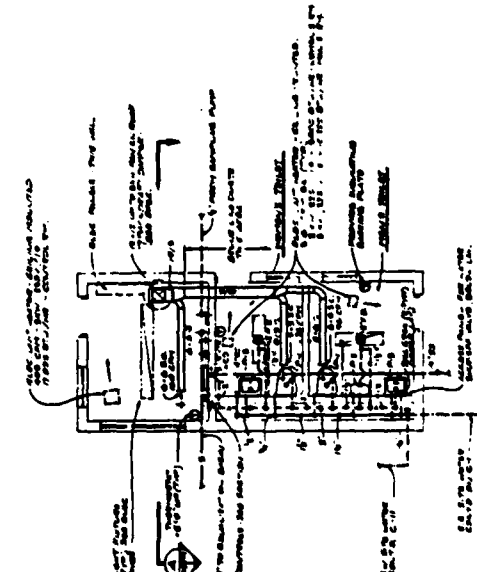
SECTION 1



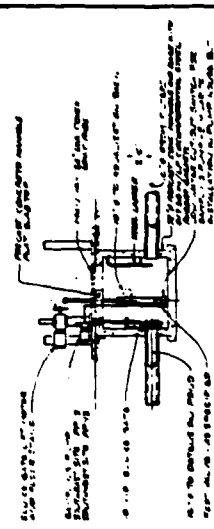
TURBIDITY METER TYPE 1 SCHEMATIC

PLUMBING FIXTURE SCHEDULE

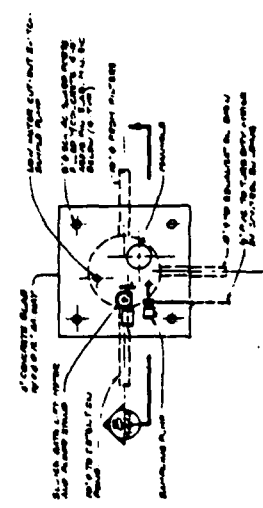
NO.	DESCRIPTION	QTY.	UNIT
1	WATER VALVE - 1/2" NPT	1	EA
2	WATER VALVE - 1/2" NPT	1	EA
3	WATER VALVE - 1/2" NPT	1	EA
4	WATER VALVE - 1/2" NPT	1	EA
5	WATER VALVE - 1/2" NPT	1	EA
6	WATER VALVE - 1/2" NPT	1	EA
7	WATER VALVE - 1/2" NPT	1	EA
8	WATER VALVE - 1/2" NPT	1	EA
9	WATER VALVE - 1/2" NPT	1	EA
10	WATER VALVE - 1/2" NPT	1	EA



CONTROL B.D.G. FLOOR PLAN



SECTION 2



PLAN

TURBIDITY METER / DIVISION 11-10-10

WORK ORDER

NO.	DATE	BY	FOR
1	10/10/10	J. J.	FOR POLLUTION CONTROL

FOR POLLUTION CONTROL
SOUTHWEST WASHINGTON
DIVISION 11-10-10
DIVISION 11-10-10

222-35-152

SAFETY PAYS Figure 12

FUNCTIONAL ANALYSIS - VE PAYS

PLAN
SCALE 1:10

SECTION
SCALE 1:10

DETAIL
SCALE 1:10

NOTES

1. THE WHEEL GUIDE IS A DEVICE WHICH IS USED TO GUIDE THE WHEELS OF A MOTOR VEHICLE WHEN IT IS BEING DRIVEN ON A CURVE.
2. THE WHEEL GUIDE IS MADE OF STEEL AND IS MOUNTED ON A BASE.
3. THE WHEEL GUIDE IS USED TO GUIDE THE WHEELS OF A MOTOR VEHICLE WHEN IT IS BEING DRIVEN ON A CURVE.
4. THE WHEEL GUIDE IS USED TO GUIDE THE WHEELS OF A MOTOR VEHICLE WHEN IT IS BEING DRIVEN ON A CURVE.
5. THE WHEEL GUIDE IS USED TO GUIDE THE WHEELS OF A MOTOR VEHICLE WHEN IT IS BEING DRIVEN ON A CURVE.

NO.	DESCRIPTION	QTY.	UNIT	REMARKS
1	WHEEL GUIDE	1	PC	
2	BASE	1	PC	
3	SCREW	4	PC	
4	NUT	4	PC	
5	WASHER	4	PC	

SECTION 1
SCALE 1:10

SECTION 2
SCALE 1:10

SECTION 3
SCALE 1:10

SECTION 4
SCALE 1:10

SECTION 5
SCALE 1:10

SECTION 6
SCALE 1:10

SECTION 7
SCALE 1:10

SECTION 8
SCALE 1:10

SECTION 9
SCALE 1:10

SECTION 10
SCALE 1:10

SECTION 11
SCALE 1:10

SECTION 12
SCALE 1:10

SECTION 13
SCALE 1:10

SECTION 14
SCALE 1:10

SECTION 15
SCALE 1:10

SECTION 16
SCALE 1:10

SECTION 17
SCALE 1:10

SECTION 18
SCALE 1:10

SECTION 19
SCALE 1:10

SECTION 20
SCALE 1:10

SECTION 21
SCALE 1:10

SECTION 22
SCALE 1:10

SECTION 23
SCALE 1:10

SECTION 24
SCALE 1:10

SECTION 25
SCALE 1:10

SECTION 26
SCALE 1:10

SECTION 27
SCALE 1:10

SECTION 28
SCALE 1:10

SECTION 29
SCALE 1:10

SECTION 30
SCALE 1:10

SECTION 31
SCALE 1:10

SECTION 32
SCALE 1:10

SECTION 33
SCALE 1:10

SECTION 34
SCALE 1:10

SECTION 35
SCALE 1:10

SECTION 36
SCALE 1:10

SECTION 37
SCALE 1:10

SECTION 38
SCALE 1:10

SECTION 39
SCALE 1:10

SECTION 40
SCALE 1:10

SECTION 41
SCALE 1:10

SECTION 42
SCALE 1:10

SECTION 43
SCALE 1:10

SECTION 44
SCALE 1:10

SECTION 45
SCALE 1:10

SECTION 46
SCALE 1:10

SECTION 47
SCALE 1:10

SECTION 48
SCALE 1:10

SECTION 49
SCALE 1:10

SECTION 50
SCALE 1:10

SECTION 51
SCALE 1:10

SECTION 52
SCALE 1:10

SECTION 53
SCALE 1:10

SECTION 54
SCALE 1:10

SECTION 55
SCALE 1:10

SECTION 56
SCALE 1:10

SECTION 57
SCALE 1:10

SECTION 58
SCALE 1:10

SECTION 59
SCALE 1:10

SECTION 60
SCALE 1:10

SECTION 61
SCALE 1:10

SECTION 62
SCALE 1:10

SECTION 63
SCALE 1:10

SECTION 64
SCALE 1:10

SECTION 65
SCALE 1:10

SECTION 66
SCALE 1:10

SECTION 67
SCALE 1:10

SECTION 68
SCALE 1:10

SECTION 69
SCALE 1:10

SECTION 70
SCALE 1:10

SECTION 71
SCALE 1:10

SECTION 72
SCALE 1:10

SECTION 73
SCALE 1:10

SECTION 74
SCALE 1:10

SECTION 75
SCALE 1:10

SECTION 76
SCALE 1:10

SECTION 77
SCALE 1:10

SECTION 78
SCALE 1:10

SECTION 79
SCALE 1:10

SECTION 80
SCALE 1:10

SECTION 81
SCALE 1:10

SECTION 82
SCALE 1:10

SECTION 83
SCALE 1:10

SECTION 84
SCALE 1:10

SECTION 85
SCALE 1:10

SECTION 86
SCALE 1:10

SECTION 87
SCALE 1:10

SECTION 88
SCALE 1:10

SECTION 89
SCALE 1:10

SECTION 90
SCALE 1:10

SECTION 91
SCALE 1:10

SECTION 92
SCALE 1:10

SECTION 93
SCALE 1:10

SECTION 94
SCALE 1:10

SECTION 95
SCALE 1:10

SECTION 96
SCALE 1:10

SECTION 97
SCALE 1:10

SECTION 98
SCALE 1:10

SECTION 99
SCALE 1:10

SECTION 100
SCALE 1:10

SECTION 101
SCALE 1:10

SECTION 102
SCALE 1:10

SECTION 103
SCALE 1:10

SECTION 104
SCALE 1:10

SECTION 105
SCALE 1:10

SECTION 106
SCALE 1:10

SECTION 107
SCALE 1:10

SECTION 108
SCALE 1:10

SECTION 109
SCALE 1:10

SECTION 110
SCALE 1:10

SECTION 111
SCALE 1:10

SECTION 112
SCALE 1:10

SECTION 113
SCALE 1:10

SECTION 114
SCALE 1:10

SECTION 115
SCALE 1:10

SECTION 116
SCALE 1:10

SECTION 117
SCALE 1:10

SECTION 118
SCALE 1:10

SECTION 119
SCALE 1:10

SECTION 120
SCALE 1:10

SECTION 121
SCALE 1:10

SECTION 122
SCALE 1:10

SECTION 123
SCALE 1:10

SECTION 124
SCALE 1:10

SECTION 125
SCALE 1:10

SECTION 126
SCALE 1:10

SECTION 127
SCALE 1:10

SECTION 128
SCALE 1:10

SECTION 129
SCALE 1:10

SECTION 130
SCALE 1:10

SECTION 131
SCALE 1:10

SECTION 132
SCALE 1:10

SECTION 133
SCALE 1:10

SECTION 134
SCALE 1:10

SECTION 135
SCALE 1:10

SECTION 136
SCALE 1:10

SECTION 137
SCALE 1:10

SECTION 138
SCALE 1:10

SECTION 139
SCALE 1:10

SECTION 140
SCALE 1:10

SECTION 141
SCALE 1:10

SECTION 142
SCALE 1:10

SECTION 143
SCALE 1:10

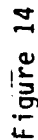
SECTION 144
SCALE 1:10

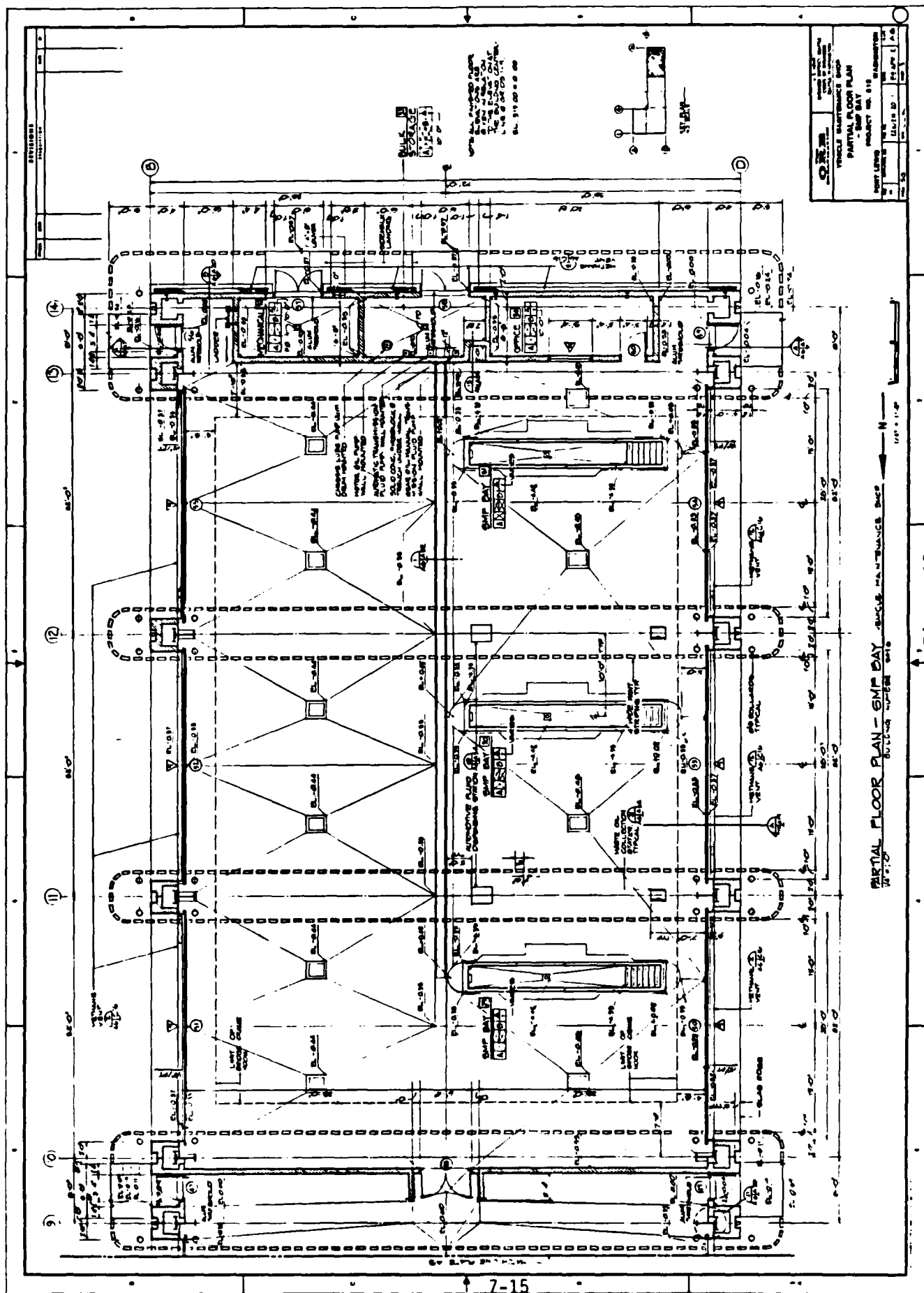
SECTION 145
SCALE 1:10

SECTION 146
SCALE 1:10

SECTION 147
SCALE 1:10

Figure 13





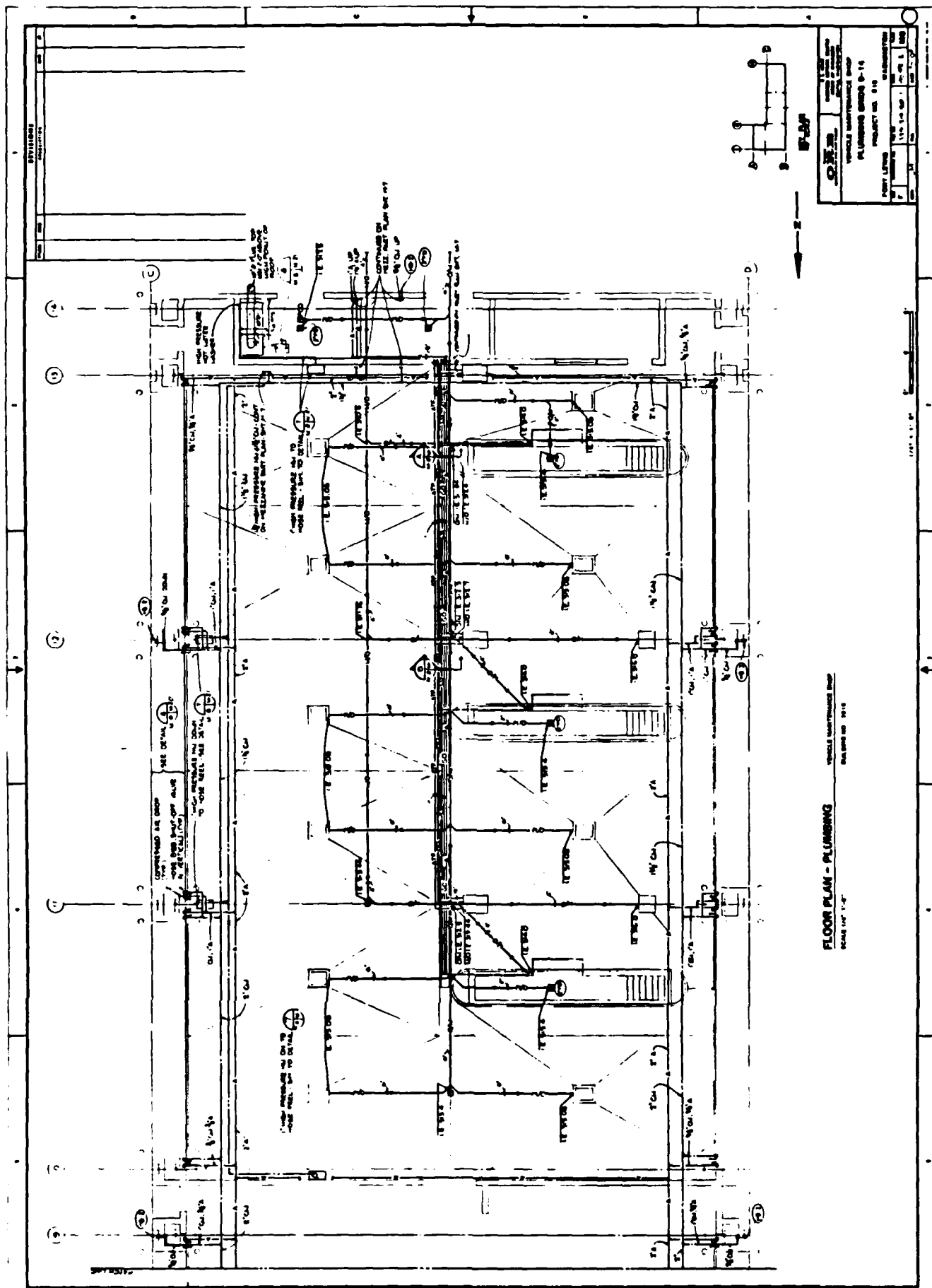


Figure 16

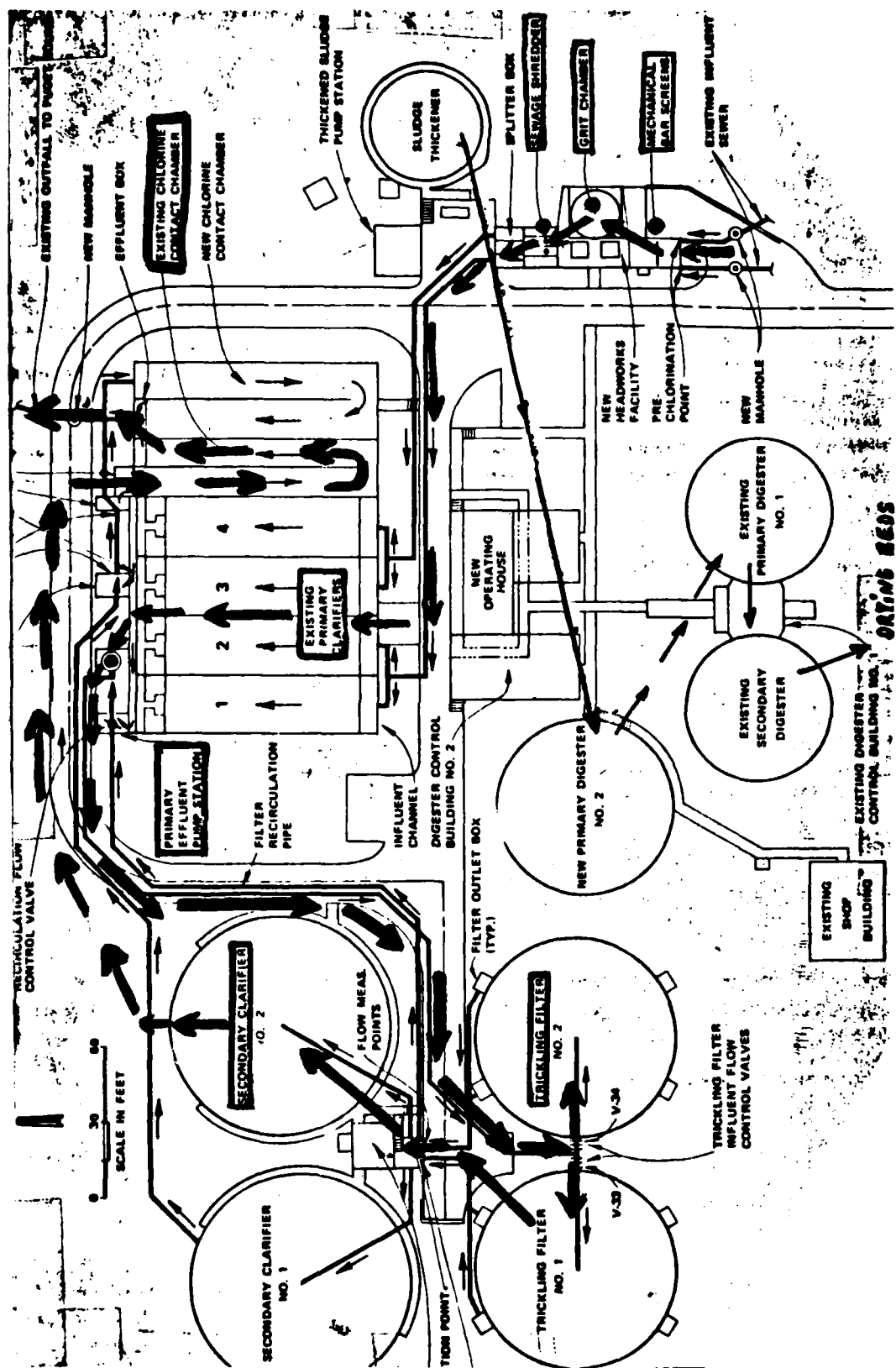


Figure 17. Wastewater Treatment Plant

The CANNON SHOP has souvenirs and gifts to remember your visit to the museum. Proceeds are used by the Friends of the Museum to help support museum programs and exhibits.

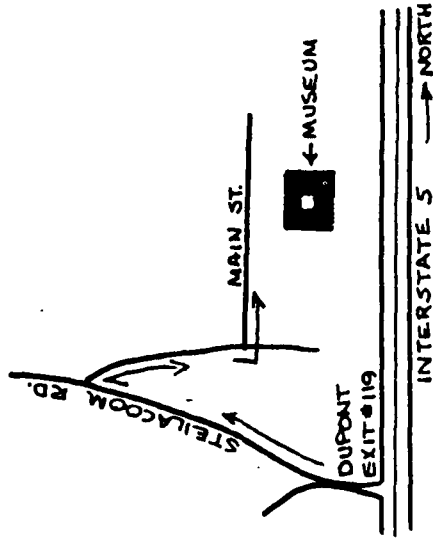
THE FRIENDS OF THE FORT LEWIS MILITARY MUSEUM is a private group established to further the interest in military history of the Pacific Northwest, and to provide the museum with funds for programs and exhibits. Membership information is available at the Information Desk in the lobby.

MUSEUM SERVICES:

TOURS: Guided tours for groups of 20 or more can be scheduled by phoning the museum Monday through Friday, 967-7206.

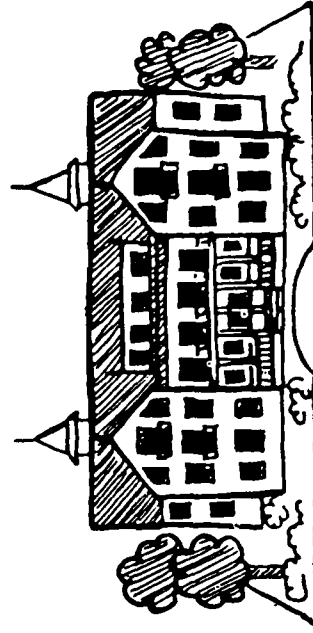
REFERENCE/RESEARCH: Researchers are allowed access to museum materials by appointment during business hours (Monday - Friday, 8-4pm). These materials include published and unpublished manuscripts, books, periodicals, newspapers, photos, maps and other archival materials.

PUBLICATIONS: The museum publishes brochures and pamphlets relating to the military history of the Northwest and Fort Lewis. Permanent brochures include Historic Sites & Monuments of Fort Lewis, the Museum Outside Display Park and the museum historical brochure. Other titles are available from time to time. Inquiries should be directed to the Information Desk in the lobby.



FORT LEWIS MILITARY MUSEUM

LOCATED JUST NORTH OF INTERSTATE 5
AT THE DUPONT/STEILACOOM EXIT, #119



HISTORY OF THE MUSEUM: The Museum was originally established in 1971 in a two-story barracks on main Fort Lewis. In July 1973, it was relocated and rededicated in the old Fort Lewis Inn.

HISTORY OF THE BUILDING: The Inn, constructed in July of 1918 by the Salvation Army and called the Red Shield Inn, was used as a lodge and social center for soldiers and their visitors. In July 1921, the Army purchased it on a "Quit Claim" deed for \$1.00, and renamed it the Camp Lewis Inn. In 1927, the Camp became a Fort, and the hotel-guest house acquired the title it was to keep for 46 years - Fort Lewis Inn. The building was entered on the National Register for Historic Places in February 1979.

The Fort Lewis Military Museum is a US Army Museum within the United States Army Museum System. It was certified by the Center for Military History, Washington, D.C. in 1982.

PUBLIC HRS: TUES-SUN, NOON TO 4PM
CLOSED HOLIDAYS. ADMISSION FREE.

"Great joy in camp we are in view of the Ocean...this great Pacific Ocean which we been so long anxious to see, and the roeing or noise made by the waves breaking on the rocky shores (as I suppose) may be heard distinctly...."

Entry with original spelling, from the journal of Captain William Clark November 7, 1805

Since Lewis and Clark's epic journey overland from the Mississippi River to the Pacific Ocean 1803-06, the United States military has played a crucial role in the life of the Pacific Northwest. This role is chronologically described in the three main exhibit galleries at the museum.

You will be able to trace the grand sweep of Pacific Northwest military history from the earliest explorers to the present day. We hope you enjoy your visit.

* * * * *

The US Army has always been known for its love of traditions and its respect for history. To preserve its centuries-old heritage, museums are an important source to scholars and historians, and play a valid role in teaching tactics and strategy to the military leaders of tomorrow.

The LOBBY provides access to the gift shop, drinking fountain, information desk and all exhibit galleries. The restrooms are located in the two exhibit galleries to the left and right of the lobby.

The EARLY YEARS TO WORLD WAR I gallery starts with the discovery and exploration of the Pacific Northwest. It continues with the fur trading activities of the Hudson Bay Company, the establishment of frontier forts, the Indian Wars and the organization of a state militia and its combat in the Philippine Insurrection. The gallery concludes with the building of Camp Lewis in 1917 and the 91st Infantry Division's combat in World War I.

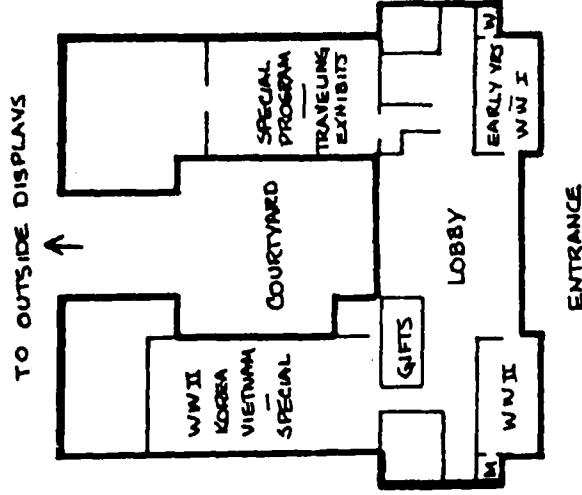
The WORLD WAR II gallery begins with the era of the 1930's and construction of permanent barracks and buildings. The displays go on to describe the involvement of the Pacific Northwest in both the European and Pacific campaigns of World War II. You will discover the intense training and activities of the post prior to and during World War II.

The CROWN ROOM gallery continues the World War II story and further activities of the 8 major infantry divisions from Fort Lewis. You will learn about changes in weapons and tactics during the Korean and Vietnam conflicts. Results of past combat involvement are reflected in the current training and organization. A highlight of this gallery is the OH-23C helicopter.

The COURTYARD features items from pre-World War II up to the latest experimental attack vehicle.

The OUTSIDE DISPLAYS behind the museum encompass military vehicles from World War I up to present day. You will experience the awesome size and power of the heavy tanks, the mobility of the artillery pieces and see armored cars and personnel carriers.

NOTICE...These vehicles are for your viewing pleasure and education only. Tampering with any of the equipment may result in prosecution.



BIBLIOGRAPHY

Note: (Parentheses) indicate where references are incorporated in these workshop materials.

Campbell, M. and W.M. Glenn. Profit from Pollution Prevention, A Guide to Industrial Waste Reduction and Recycling, Pollution Probe Foundation, Toronto, Canada, 1982.

CH2M HILL. Industrial Processes to Reduce Generation of Hazardous Waste at DoD Facilities, Phase 1 Report, Evaluation of 40 Case Studies, Prepared for the Department of Defense Environmental Leadership Project and the U.S. Army Corps of Engineers, Defense Technical Information Center DTIC AD157319, February 21, 1985.

CH2M HILL. Industrial Processes to Reduce Generation of Hazardous Waste at DoD Facilities, Phase 2 Report, Evaluation of 18 Case Studies, Prepared for the DoD Environmental Leadership Project and the U.S. Army Corps of Engineers, July 1985.

CH2M HILL and PEER Consultants. Project of Excellence, Plastic Media Paint Stripping, Hill Air Force Base, Phase 3 Workshop, Prepared for the DoD Environmental Leadership Project and the U.S. Army Corps of Engineers, August 13-14, 1985.

CH2M HILL and PEER Consultants. Project of Excellence, Innovative Hard Chrome Plating, Pensacola Naval Air Rework Facility, Phase 3 Workshop, Prepared for the DoD Environmental Leadership Project and the U.S. Army Corps of Engineers, September 11-12, 1985.

CH2M HILL and PEER Consultants. Project of Excellence, Centralized Vehicle Wash Racks and Scheduled Maintenance Facilities, Fort Lewis, Washington, Prepared for the DoD Environmental Leadership Project and the U.S. Army Corps of Engineers, October 2-3, 1985. (This document)

DeLeuw Cather & Co. Design Supplement, POL Pollution Control, Fort Lewis, Washington, Project 375, Prepared for the Sacramento District, Corps of Engineers, November 1978.

Heiberg, LTG E.R., Chief of Engineers and Commander, U.S. Army Corps of Engineers. Interview, Army Research, Development and Acquisition Magazine, pages 14-16, July-August 1985.

Higgins, B. Survey of Environmental Problems at Selected Army Installations, FESA-TS-2068, US. Army Facilities Engineering Support Agency, December 1979.

Higgins, T.E., R.B. Fergus, and D.P. Desher, CH2M HILL. Evaluation of Industrial Process Modifications to Reduce Hazardous Wastes in the Armed Services, Paper presented at the 40th Annual Purdue Industrial Waste Conference, May 14-16, 1985.

Kelley, J.V. Military Manpower Analysis, Central Vehicle Wash Facilities, Fort Polk, Louisiana. (Section 5.1)

Kramer, Chin & Mayo, Inc. Fort Lewis Installation Expansion Capability Plan: Step I - Utility Analysis; Step II - Training Facility Analysis; Step III - Summary; and Step IV - Cantonment, January 1978.

Leverenz, D.J. FTAT Program, A Technology Transfer Vehicle, The Military Engineer, pages 438-439, August, 1985. (Appendix 2.2)

ORB Organization. Pollution Abatement Study for Fort Lewis, Washington, Prepared for the Corps of Engineers, Sacramento District, June 1979.

ORB Architects & Planners, Renton, Washington. PM 519, Vehicle Maintenance Shop, 95% Review, Prepared for the Seattle District, Corps of Engineers, June 1985. (Specifications for oil/water separator and hot water washer system: Appendices 3.1 and 3.2)

S.E. Huey Co., Monroe, Louisiana. Final Design Analysis, Line Item No. 165, Tank Prewash Facilities, Fort Polk, Louisiana, 1978.

U.S. Army. CERL/FORSCOM Central Vehicle Wash Facility Conference, Atlanta, Georgia, 2-3 May 1985.

U.S. Army Corps of Engineers (USACE). Vehicle Maintenance and Pollution Control, Overview of the TOE Vehicle Maintenance Activities and Pollution Control at Army Installations, ETL 1110-3-(1), 28 February 1983.

USACE. Vehicle Maintenance Cleaning and Servicing Operations, Recommended Design Guidance for Cost-Effective Vehicle Maintenance Cleaning and Servicing, ETL 1110-3-(2), Undated.

USACE. Vehicle Maintenance Facilities and Pollution Control, Central Exterior Wash Facility, ETL 1110-3-(3), 30 March 1983.

USACE. Vehicle Maintenance Facilities and Pollution Control, Pollution Control Requirements, ETL 1110-3-X.

USACE. Site and Master Planning Considerations for Central Vehicle Wash Facilities and Maintenance Facilities, ETL 1110-3-X, 30 June 1984.

USACE. DAEN-MPE-D Letter, Subject: Standardization of Criteria for Tactical Vehicle Wash Facilities, 19 August 1982. (Section 3.1)

USACE. DAEN-ECE-G Message 131603Z, Subject: Vehicle Washracks/Scheduled Maintenance Facilities, Pollution Control Centers of Expertise, 13 March 1984. (Section 3.2)

USACE. DAEN-ECE-G Message 191531Z, Subject: Centralized Vehicle Wash Facilities, 19 June 1984. (Section 3.3)

USACE. DAEN-ECE-G Message 121412Z, Subject: Centralized Vehicle Washracks and Scheduled Maintenance Pollution Abatement, 12 August 1985. (Section 3.4)

USACE, Construction Engineering Research Laboratory (CERL). Vehicle Washing Operations and Wastewater Discharges, Fort Drum, New York - Findings and Recommendations, Technical Report E-80, June 1976.

USACE, CERL. Recommended Design Criteria for Wastewater Treatment at Proposed Consolidated Tactical Vehicle Wash Facility, Fort Drum, New York, Interim Report N-26, July 1977.

USACE, CERL. Pretreatment of Waste Discharges from Improved Army Tactical Equipment Maintenance Facilities, Technical Report N-107, August 1981.

USACE, CERL. Water Pollution Control in Army Table of Organization and Equipment (TOE) Maintenance Operation: Overview and Assessment, Technical Report N-128, May 1982.

USACE, CERL. Preliminary Guidelines for Safe and Effective Use of Hot, High-Pressure Washers for Maintenance Cleaning of Army Vehicles, Technical Report N-138, November 1982.

USACE, CERL. Videotape: Vehicle Wash and Maintenance Facilities, 15 minutes, 1983. (Transcript: Section 6.1)

USACE, CERL. FTAT Fact Sheet: Indoor Vehicle Platform Retrofit, March 1984. (Section 2.3)

USACE, CERL. Return on Investment (ROI) Case Study: Centralized Vehicle Washing and Maintenance Facilities, Draft, 20 February 1985.

USACE, Fort Worth District. DD Form 1354, Transfer and Acceptance of Military Real Property: Tank Pre-Wash Facilities - North Fort and South Fort Polk, 22 July 1981.

USACE, Sacramento District. Sewage Treatment Plant Modifications, Fort Lewis, Washington, Analysis of Design: Part I - Basis for Design, Part II - Design Computations, Prepared by Cornell, Howland, Hayes and Merryfield, Clair A. Hill Associates, December 1972.

USACE, Sacramento District. DD Form 1354, Transfer and Acceptance of Military Real Property, POL Pollution Control, Yakima Firing Center, Washington, 15 August 1980.

U.S. Army, Fort Lewis. DD Form 1391, Military Construction Line Item Data, Consolidated Vehicle Washing Facilities with Oil and Sediment Pollution Control (Pilot Project), 2 July 1977. (Section 4.1)

U.S. Army, Fort Lewis. Secretary of the Army Environmental Quality Award Application, 1982.

U.S. Army, Fort Lewis, DIO Contracting Office. Contract DAKF57-83-D-0199: Operate, Repair and Maintain Four Government Owned Vehicle Wash Facilities, Fort Lewis, Washington, Part 1-Section C, Specifications, 31 August 1983. (separate workshop handout)

U.S. Department of Defense. Defense Environmental Quality Program Policy Memorandum DEQPPM 80-5, Department of Defense Hazardous Material Disposal Policy, 13 May 1980. (Appendix 1.3)

U.S. Department of Defense. DEQPPM 80-8, RCRA Hazardous Waste Management Regulations, 21 October 1980. (Appendix 1.4)

U.S. Department of Defense. Defense Property Disposal Manual, DoD 4160.21-M, Chapter XXI, Hazardous Property Management, April 1985. (Appendix 1.5)

U.S. Department of Labor, Occupational Safety and Health Administration. General Industry Standards, Title 29, Code of Federal Regulations, Part 1910, OSHA 2206, Revised March 11, 1983.

U.S. Environmental Protection Agency, Region 10, Seattle. Permit No. WA-002195-4, Authorization to Discharge Under the National Pollutant Discharge Elimination System, Fort Lewis, Washington, 21 January 1980.

U.S. Office of the President. Executive Order 12088, Federal Compliance With Pollution Control Standards, October 13, 1978. (Appendix 1.2)

Walker, T.J., R.L. Gross, and J.H. Jeter. Getting Rid of Hazardous Wastes, R&D Searches for Answers, Military Engineer, pages 462-465, October 1984.

Ward, B., and C. Harris. The 1984 Hazardous and Solid Waste Amendments: A Bold Experiment in Hazardous Waste Management, Journal of the Air Pollution Control Association, 35(3), pages 254-258, March 1985. (Appendix 1.1)

White, D.C. EPA Program for Treatment Alternatives for Hazardous Waste, Journal of the Air Pollution Control Association, 35(4), pages 369-372, April 1985.

Wickham, GEN J.A., Army Chief of Staff. Innovation: The Tough Requirement, Army Research, Development and Acquisition Magazine, pages 16-18, January-February 1985. (Appendix 2.1)

APPENDIX 1.0 POLICY DOCUMENTS CONCERNING DOD HAZARDOUS WASTE

- 1.1 The Hazardous and Solid Waste Amendments (Ward and Harris, March 1985)
- 1.2 Executive Order 12088, Federal Compliance with Pollution Control
- 1.3 DEQPPM 80-5, DoD Hazardous Material Disposal Policy
- 1.4 DEQPPM 80-8, RCRA Hazardous Waste Management Regulations
- 1.5 DoD 4160.21-M, Defense Disposal Manual, Chapter XXI, Hazardous Property Management

HAZARDOUS WASTE MANAGEMENT

APPENDIX 1.1

The 1984 Hazardous and Solid Waste Amendments: A Bold Experiment in Hazardous Waste Management

Bud Ward

The Environmental Forum
Washington, D.C.

Christopher Harris

Zuckert, Scoutt, Rasenberger and Johnson
Washington, D.C.

The 1984 amendments by Congress to the Resource Conservation and Recovery Act (RCRA) resulted primarily from a sense of frustration with EPA's apparent lack of progress in addressing the myriad problems associated with hazardous waste management. The amendments were also a manifestation of Congress' clear sense of purpose in wanting to steer a radically different course at much greater speed. Whether this bold experiment works remains to be seen. EPA appears to be committed to carrying out both the letter and spirit of the Hazardous and Solid Waste Amendments of 1984, but no one should underestimate the magnitude of the task.

"Cradle to grave."

The term gained currency in the environmental field in the mid-seventies. "From beginning to end," it was meant to imply . . . and all in between. No voids or loopholes.

The "cradle to grave" approach was what Congress had in mind when in 1976 it passed the Resource Conservation and Recovery Act. By enacting RCRA Congress believed it was "closing the loop," that is, extending to the land the kind of regulatory safety net previously extended to air through the Clean Air Act and to water through the Federal Water Pollution Control Act. Among the reforms mandated by that Act was the requirement that generators comply with a comprehensive manifest system, a method by which hazardous wastes would be traced from the point of manufacture through to their ultimate—and presumably safe—disposal or destruction.

However, the theory and practice didn't quite match. And the public's awareness of that fact (prompted in part by Congressional scrutiny of the RCRA program) ultimately lead to the enactment in 1984 of a dramatic overhaul of the entire RCRA waste management system. Looking back over the past few years it is apparent that a number of

related factors converged in the early 1980s to set the stage for the revolutionary changes that Congress prescribed.

First, it became increasingly clear to the Congress that far more hazardous waste actually was being produced each year in the United States than previously had been estimated. In 1980 while EPA was working to develop implementing RCRA regulations, and as Congress in 1982 began to consider reauthorization of RCRA, estimates were that some 11 billion gallons—40 million metric tons—of hazardous wastes were produced each year in the U.S. By mid-1983, however, the estimated amount of hazardous waste produced in the United States increased to about 40 billion gallons annually—150 million metric tons—a nearly fourfold increase. In mid-1984, EPA's final "National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities" calculated that the amount of hazardous wastes generated each year in the U.S. in fact totaled more than 71 billion gallons—264 million metric tons. The actual quantity was widely acknowledged to be higher since various categories of hazardous waste (such as the amount produced by the so called small quantity generators) were not included in the survey.

Second, reliance on land disposal of

hazardous waste continued unabated. EPA's National Survey revealed that far more hazardous waste was disposed of in surface impoundments, in underground injection wells or landfills than through incineration or other methods of treatment. In fact, less than one-fourth of the nation's hazardous waste treatment capacity was being used, according to the EPA study.

Third, concern over groundwater contamination became widespread throughout the early 1980s. The public's awareness of groundwater contamination increased dramatically as a result of investigations of the environmental and health problems associated with hazardous waste sites under the Comprehensive Environmental Response, Compensation and Liability Act (commonly known as Superfund). Superfund sites were blamed, in large part, on the failure to require operating hazardous waste sites to comply with the most basic safeguards to protect groundwater. At the same time leaks from underground storage tanks that caused the contamination of drinking water supplies in dozens of communities received national media attention.

Fourth, as Congress investigated the integrity of hazardous waste landfills, it came to the conclusion that there is no such thing as a "secure" landfill (particularly for liquid wastes) and that virtually all conventional landfills ultimately will leak into subsurface soils and groundwater. Congress also learned that an even greater danger is posed by surface impoundments because they receive much larger quantities of waste and because four out of ten impoundments have no liner. (Very few have been equipped with double liners.) Proponents of the 1984 RCRA Amendments were convinced that continued

overdependence on these methods of land disposal created an unnecessary risk to human health and the environment, particularly since cost-effective methods of treatment were available.

Driven primarily by these considerations, but also clearly influenced by the political controversies surrounding EPA mismanagement of the hazardous waste programs during the first two years of the Reagan Administration, Congress in 1984 succeeded in doing what it previously had been unable to do since the December 1980 passage of Superfund: that is, enact a major piece of environmental legislation. In fact, President Reagan's November 8, 1984 signing of the Hazardous and Solid Waste Amendments of 1984 constituted the final step of the most comprehensive revision of any environmental law since the 1977 rewrite of the Clean Water Act.

Land Disposal Provisions— The Heart of the New Law

Despite the enormous scope of the 1984 amendments, it is not difficult to single out the set of provisions that form the keystone of the new statute. As expressed in the provision setting forth its findings and objectives, Congress declared that certain classes of land disposal facilities are not capable of assuring long-term containment of certain hazardous wastes. To avoid substantial risk to human health and the environment, Congress said reliance on land disposal should be minimized or eliminated, and it said land disposal, particularly landfill and surface impoundments, should be the least favored method for managing hazardous wastes.

To accomplish this purpose, the 1984 amendments provide EPA with unusually detailed instructions on cutting back on land disposal. Section 201 requires EPA by November 1986 to promulgate rules to prohibit land disposal of dioxins and solvents unless the EPA Administrator affirmatively finds, "to a reasonable degree of certainty," that the prohibition on land disposal of those wastes is not necessary to protect public health and the environment. Eight months later, all "California list" wastes (arsenic, cyanide, mercury, lead, halogenated organics and several other hazardous wastes) are banned from land disposal unless the Administrator makes the same type of finding.

The law also gives EPA rolling deadlines of 45, 55 and 66 months by which it must adopt rules or make similar "not necessary" findings on land disposal of all remaining listed and identified hazardous wastes, with EPA to decide the first third of the wastes within 45 months, another third within 55 months and the final third by the end of 66

months after enactment. In a unique Congressional strategy known as the "hammer," Congress mandated that the land disposal bans will take place automatically if EPA misses the statutory deadlines for acting on its own.

Section 202 of the 1984 Amendments specifies that for new, replacement, or expanded landfills permitted after November 8, 1984 EPA's minimum acceptable technology standard must provide for at least two liners as well as for a leachate collection system above and between the liners.

In Section 215 Congress went beyond the issue of addressing merely new surface impoundments and extended additional control requirements also to existing impoundments. Specifically, Congress established detailed technological retrofit requirements—double liners and leak detection, or their equivalents, along with groundwater existing monitoring requirements—as the minimum standard. Unless these impoundments are allowed an exemption through a limited variance, the impoundments have four years in which to comply; otherwise they can no longer receive, store, or treat any hazardous wastes.

Leaking Underground Storage Tanks

It is worth mentioning that the Hazardous and Solid Waste Amendments were not limited to hazardous and solid wastes. The new law also creates a major new regulatory program to control leaks from the uncounted hundreds of thousands of underground product storage tanks around the country. As a result, it is quite possible that the underground storage tanks regulatory program could be as large as all other elements of the RCRA program.

In passing the new regulatory program, Congress was acting on information, compiled by the Congressional Research Service, that probably somewhere between 75,000 and 100,000 tanks are leaking into the groundwater, surface water, or subsurface soils and that another 350,000 will be leaking in the next five years. However, the actual number of underground storage tanks in the United States is unknown, as is the number of tanks actually leaking. Given that many tanks are believed to be nearing the end of their expected 15–20 years life spans, estimates are that a great many more tanks will begin leaking over the next decade.

HAZARDOUS WASTE MANAGEMENT

Congress in Title VI mandated adoption of a new regulatory program applying to tanks (and connected piping) that store at least 10% of the total volume of their "regulated substance" underground. The program is to apply to petroleum products and hazardous substances designated under Superfund.

To assist EPA and the states in developing a nationwide inventory of underground tanks, owners of underground tanks have until May 1986 to notify a designated state or local agency of the existence of each tank as well as its age, size, type, location and uses. Similar information is also required for tanks which have been taken out of operation since January 1, 1974.

On the regulatory front, EPA is charged with promulgating leak detection, prevention, and corrective action regulations for underground storage tank owners. EPA's regulations, which will apply to new as well as existing tanks, must be "sufficient to protect human health and the environment" and they may take into account differences in climate conditions, tank use and age, hydrogeology, and other factors. EPA also has authority under the law to adopt rules on insurance or other forms of financial responsibility for corrective actions and for compensation to third parties for bodily injury or property damages.

Title VI also prohibits the installation of "bare steel" tanks (i.e. those without adequate corrosion protection) unless properly conducted soil tests show that the resistivity (the corrosion potential) of the soil is 12,000 ohm/cm or greater. Although the Administrator is authorized to modify this prohibition, it is not likely that it would be made less stringent.

Small Quantity Generators

When EPA promulgated its RCRA regulations in 1980, it exempted "small quantity generators" (those producing up to 1000 kg of hazardous waste per month) from most RCRA requirements. This regulatory decision in effect allowed those generators to dispose of wastes directly in sanitary landfills or into sewers, practices not generally regarded as safe. This "regulatory loophole," as critics described it, also exempted small quantity generators from having to notify transporters that the wastes being transported were in fact hazardous.

In response to EPA's unwillingness to impose any substantial requirements of small quantity generators, Congress in the 1984 Amendments mandated that anyone producing between 100 and 1000

kg of waste per month must, by August 1985, properly identify the wastes being transported off-site for treatment, storage or disposal. While requiring that the wastes be properly manifested, the new law states that generators in the 100-1000 kg/month range need not comply, at least initially, with the more complex requirements such as waste testing. Under the law, EPA is to complete a study of small quantity generators by the end of March 1985, and by March 1986 it must adopt rules for small generators in the 100-1000 kg/month range. If the Agency fails to promulgate rules by the end of March 1986, small quantity generator wastes as of that date must go only to hazardous waste treatment, storage, or disposal facilities permitted under Subtitle C of RCRA.

Burning and Blending

Another regulatory "loophole" that caused Congress a great deal of concern was the exemption for facilities burning hazardous wastes for the purpose of "energy recovery." The practice of blending of hazardous wastes (such as PCBs or chlorinated solvents) with heating oil for subsequent sale to unsuspecting customers had become a serious potential health problem in New York and New Jersey, and Congress was in no mood to allow it to become a nationwide health threat. Of particular concern to the Congress was the possibility—and even likelihood—that more and more hazardous wastes would be burned in boilers and other heat recovery facilities precisely to avoid RCRA regulation and the costs of treatment or disposal.

To address the "burning and blending" problem, Congress mandated that EPA be notified by facilities blending hazardous wastes with fuel for distribution or marketing for energy recovery. EPA has until November 1987 to adopt standards for transporters and facilities burning fuels containing hazardous wastes. In addition, purchasers of such fuels must be notified of the hazardous makeup of their fuels. Certain exemptions from the rules are provided for petroleum coke and for *de minimis* quantities of hazardous wastes. Onsite petroleum refinery operations are specifically exempted from the labeling requirements.

Continuing Releases—The "Mini-Superfund"

Section 206 of the 1984 Amendments, "Continuing Releases at Permitted Facilities," has been described as a "Mini-Superfund," as something of a "sleeper" within the overall Amendments.

In passing Section 206, Congress was concerned that EPA regulations did not require facilities permitted under RCRA to address all releases of hazardous wastes from all solid waste management units at a particular facility. "A facility which is causing, for example, groundwater contamination from inactive units could, therefore, seek a permit under RCRA for active units and receive the permit without having to clean up the contamination," Senate Environment and Public Works Committee Counsel Steven J. Shimberg has written.

Under the new law, permits must require "corrective action for all releases of hazardous waste or constituents from any solid waste management unit at a treatment, storage, or disposal facility seeking a permit (under Subtitle C) regardless of the time at which waste was placed in such unit."

Writing in *Legal Times of Washington*, attorneys James A. Rogers and Dorothy A. Darrah of Skadden, Arps, Slate, Meagher & Flom in Washington, D.C., have stated accurately that Section 206 "is designed to remedy the situation in which a landfill owner attempts to demonstrate to EPA that contamination in groundwater emanates from 'old' (pre-RCRA) disposal and that therefore remedial action required as part of a RCRA permit is inappropriate." According to Rogers and Darrah, under EPA's current regulations, an owner need not clean up plumes of contamination under a facility when those plumes are attributable to wastes disposed of prior to the effective date of EPA's groundwater cleanup (corrective action) requirements. "Congress now has deemed this dichotomy unacceptable," they wrote. Rogers and Darrah see in the Section 206 provisions "enormous implications for the many industrial sites with subsurface contamination resulting from pre-RCRA activities. The new section appears to say that any permit issued (by EPA or an authorized state) must require the cleanup of problems at all areas on the site even if the source of the pollution would not itself now be regulated as a hazardous waste unit under RCRA because the materials disposed of are not hazardous wastes or because they were placed there before RCRA, or both."

However, in order to avoid delays in the permit process, Congress provided that permits may be issued with compliance schedules for corrective action in cases where the corrective action cannot be completed prior to issuance of the permit.

Imminent and Substantial Endangerment and Citizen Suits

Although RCRA is fundamentally a regulatory scheme for addressing hazardous waste problems, it also provides

HAZARDOUS WASTE MANAGEMENT

EPA under Section 7003 with the ability to obtain injunctive relief against any person contributing to an "imminent and substantial" endangerment created by the handling, storage, treatment, transportation or disposal of any solid or hazardous waste. According to a 1979 report by the Subcommittee on Oversight and Investigations of the House Interstate and Foreign Commerce Committee (the Eckhardt Report), Section 7003 was designed to provide the EPA Administrator with "overriding authority" to respond to situations involving a substantial threat to public health or the environment regardless of other remedies provided in RCRA.

Since 1979, the Department of Justice, on behalf of EPA, has filed approximately 90 Section 7003 actions. (One of the first of these was against the companies responsible for the improper disposal at Love Canal.) Yet, despite its extensive use, the wording of Section 7003 was not free from ambiguity, and a number of courts have ruled that its reach is limited.

Taken together, these adverse rulings held that a Section 7003 action could not be used to compel a non-negligent offsite generator to help in the clean-up of a waste site where its wastes were disposed of. Although other court decisions gave Section 7003 a much broader reading, Congress was worried that the Government's principal enforcement tool was being misinterpreted and seriously weakened. Section 7003 was rewritten and, although the revisions were labeled a simple "clarification" of existing law, the House Energy and Commerce Committee left no doubt that it intended to legislatively overrule the adverse holdings:

"These amendments are intended to clarify the breadth of Section 7003 as to the persons, conditions and acts it covers. . . . [A]nyone who has contributed to the creation, existence or maintenance of an imminent and substantial endangerment is subject to the equitable power of Section 7003, without regard to fault or negligence. Such persons include, but are not limited to, past and present generators (both off-site and on-site) . . . past and present owners and operators of waste treatment storage or disposal facilities and past and present transporters . . . Thus, for example, non-negligent generators whose wastes are no longer being deposited or dumped at a particular site may be ordered to abate the hazard to health or the environment posed by the leaking of wastes they once deposited or caused to be deposited on the site."

Having made sure that the imminent and substantial endangerment provision could be used as originally intended, Congress also provided to individual

citizens the right to force clean-up of hazardous waste sites. Thus, as a result of a major expansion of the existing citizens suit provision (7002), any person may bring an action to abate an imminent and substantial endangerment involving the management or disposal of solid or hazardous waste.

Although Congress placed substantial enforcement authority in the hands of ordinary citizens, it took steps to assure that the citizens suit provision was not used to prevent or delay Superfund clean-ups or interfere with ongoing RCRA enforcement efforts. Therefore, a citizen may not sue 1) where EPA has commenced, and is diligently prosecuting, actions under Section 7003 or Section 106 of Superfund; 2) where the State has commenced and is diligently prosecuting an imminent and substantial endangerment action under Section 7002; 3) while the Administrator or the State is actually engaging in a removal action under Section 104 of Superfund or has incurred costs to initiate a Remedial Investigation/Feasibility Study (RIFS) under Section 104 of Superfund and is diligently proceeding with a remedial action; and 4) where the Administrator has obtained a court order (including a consent decree) or issued an administrative order under Section 106 of Superfund, or Section 7003 pursuant to which a responsible party is diligently conducting a removal action, RIFS or proceeding with a remedial action.

Moreover, citizen suits cannot be used to challenge the siting or permitting of hazardous waste facilities.

Conclusion

The numerous and, in some cases, drastic revisions that Congress made to RCRA resulted primarily from a sense of frustration with EPA's apparent lack of progress in addressing the myriad problems associated with hazardous waste management. The 1984 amendments were also a manifestation of Congress' clear sense of purpose in wanting to steer a radically different course—and at much greater speed. Whether this bold experiment works remains to be seen. EPA appears to be committed to carrying out both the letter and spirit of the Hazardous and Solid Waste Amendments of 1984, but no one should underestimate the magnitude of the task.

Bud Ward is Editor of *The Environmental Forum*, a monthly magazine published by the Environmental Law Institute (ELI) in Washington, D.C. Christopher Harris, previously the lead House counsel on the 1984 Hazardous and Solid Waste Amendments, is an attorney with the law firm of Zuckert, Scoutt, Rasenberger and Johnson in Washington, D.C. Ward and Harris are coauthors of *Hazardous Waste—Confronting the Challenge*, a new book to be published this spring by ELI.

presidential documents

[3195-01-M]

Title 3—The President

Executive Order 12088

October 13, 1978

Federal Compliance With Pollution Control Standards

By the authority vested in me as President by the Constitution and statutes of the United States of America, including Section 22 of the Toxic Substances Control Act (15 U.S.C. 2621), Section 313 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1323), Section 1447 of the Public Health Service Act, as amended by the Safe Drinking Water Act (42 U.S.C. 300j-6), Section 118 of the Clean Air Act, as amended (42 U.S.C. 7418(b)), Section 4 of the Noise Control Act of 1972 (42 U.S.C. 4903), Section 6001 of the Solid Waste Disposal Act, as amended (42 U.S.C. 6961), and Section 301 of Title 3 of the United States Code, and to ensure Federal compliance with applicable pollution control standards, it is hereby ordered as follows:

1-1. *Applicability of Pollution Control Standards.*

1-101. The head of each Executive agency is responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency.

1-102. The head of each Executive agency is responsible for compliance with applicable pollution control standards, including those established pursuant to, but not limited to, the following:

- (a) Toxic Substances Control Act (15 U.S.C. 2601 *et seq.*).
- (b) Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 *et seq.*).
- (c) Public Health Service Act, as amended by the Safe Drinking Water Act (42 U.S.C. 300f *et seq.*).
- (d) Clean Air Act, as amended (42 U.S.C. 7401 *et seq.*).
- (e) Noise Control Act of 1972 (42 U.S.C. 4901 *et seq.*).
- (f) Solid Waste Disposal Act, as amended (42 U.S.C. 6901 *et seq.*).
- (g) Radiation guidance pursuant to Section 274(h) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2021(h); see also, the Radiation Protection Guidance to Federal Agencies for Diagnostic X Rays approved by the President on January 26, 1978 and published at page 4377 of the *FEDERAL REGISTER* on February 1, 1978).
- (h) Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1401, 1402, 1411-1421, 1441-1444 and 16 U.S.C. 1431-1434).
- (i) Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 U.S.C. 136 *et seq.*).

1-103. "Applicable pollution control standards" means the same substantive, procedural, and other requirements that would apply to a private person.

1-2. *Agency Coordination.*

1-201. Each Executive agency shall cooperate with the Administrator of the Environmental Protection Agency, hereinafter referred to as the Adminis-

THE PRESIDENT

trator, and State, interstate, and local agencies in the prevention, control, and abatement of environmental pollution.

1-202. Each Executive agency shall consult with the Administrator and with State, interstate, and local agencies concerning the best techniques and methods available for the prevention, control, and abatement of environmental pollution.

1-3. *Technical Advice and Oversight.*

1-301. The Administrator shall provide technical advice and assistance to Executive agencies in order to ensure their cost effective and timely compliance with applicable pollution control standards.

1-302. The administrator shall conduct such reviews and inspections as may be necessary to monitor compliance with applicable pollution control standards by Federal facilities and activities.

1-4. *Pollution Control Plan.*

1-401. Each Executive agency shall submit to the Director of the Office of Management and Budget, through the Administrator, an annual plan for the control of environmental pollution. The plan shall provide for any necessary improvement in the design, construction, management, operation, and maintenance of Federal facilities and activities, and shall include annual cost estimates. The Administrator shall establish guidelines for developing such plans.

1-402. In preparing its plan, each Executive agency shall ensure that the plan provides for compliance with all applicable pollution control standards.

1-403. The plan shall be submitted in accordance with any other instructions that the Director of the Office of Management and Budget may issue.

1-5. *Funding.*

1-501. The head of each Executive agency shall ensure that sufficient funds for compliance with applicable pollution control standards are requested in the agency budget.

1-502. The head of each Executive agency shall ensure that funds appropriated and apportioned for the prevention, control and abatement of environmental pollution are not used for any other purpose unless permitted by law and specifically approved by the Office of Management and Budget.

1-6. *Compliance With Pollution Controls.*

1-601. Whenever the Administrator or the appropriate State, interstate, or local agency notifies an Executive agency that it is in violation of an applicable pollution control standard (see Section 1-102 of this Order), the Executive agency shall promptly consult with the notifying agency and provide for its approval a plan to achieve and maintain compliance with the applicable pollution control standard. This plan shall include an implementation schedule for coming into compliance as soon as practicable.

1-602. The Administrator shall make every effort to resolve conflicts regarding such violation between Executive agencies and, on request of any party, such conflicts between an Executive agency and a State, interstate, or a local agency. If the Administrator cannot resolve a conflict, the Administrator shall request the Director of the Office of Management and Budget to resolve the conflict.

1-603. The Director of the Office of Management and Budget shall consider unresolved conflicts at the request of the Administrator. The Director shall seek the Administrator's technological judgment and determination with regard to the applicability of statutes and regulations.

1-604. These conflict resolution procedures are in addition to, not in lieu of, other procedures, including sanctions, for the enforcement of applicable pollution control standards.

1-605. Except as expressly provided by a Presidential exemption under this Order, nothing in this Order, nor any action or inaction under this Order, shall be construed to revise or modify any applicable pollution control standard.

1-7. Limitation on Exemptions.

1-701. Exemptions from applicable pollution control standards may only be granted under statutes cited in Section 1-102(a) through 1-102(f) if the President makes the required appropriate statutory determination: that such exemption is necessary (a) in the interest of national security, or (b) in the paramount interest of the United States.

1-702. The head of an Executive agency may, from time to time, recommend to the President through the Director of the Office of Management and Budget, that an activity or facility, or uses thereof, be exempt from an applicable pollution control standard.

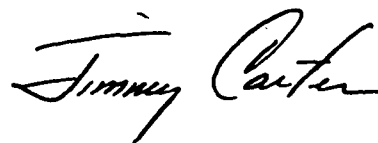
1-703. The Administrator shall advise the President, through the Director of the Office of Management and Budget, whether he agrees or disagrees with a recommendation for exemption and his reasons therefor.

1-704. The Director of the Office of Management and Budget must advise the President within sixty days of receipt of the Administrator's views.

1-8. General Provisions.

1-801. The head of each Executive agency that is responsible for the construction or operation of Federal facilities outside the United States shall ensure that such construction or operation complies with the environmental pollution control standards of general applicability in the host country or jurisdiction.

1-802. Executive Order No. 11752 of December 17, 1973, is revoked.



THE WHITE HOUSE,
October 13, 1978.

[FR Doc. 78-29406 Filed 10-13-78; 3:40 pm]

EDITORIAL NOTE: The President's statement of Oct. 13, 1978, on signing Executive Order 12088 and his memorandum for the heads of departments and agencies, dated Oct. 13, 1978, on Federal compliance with pollution control standards are printed in the Weekly Compilation of Presidential Documents (vol. 14, no. 41).



MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

APPENDIX 1.3
OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

13 MAY 1980

Defense Environmental Quality Program Policy Memorandum
(DEQPPM No. 80-5)

MEMORANDUM FOR DEPUTY FOR ENVIRONMENT, SAFETY AND OCCUPATIONAL
HEALTH, OASA (IL&FM)
DEPUTY UNDER SECRETARY OF THE NAVY
DEPUTY FOR ENVIRONMENT AND SAFETY, SAF/MIQ
DIRECTOR, DEFENSE LOGISTICS AGENCY

SUBJECT: Department of Defense Hazardous Material Disposal Policy

PURPOSE: This is to provide Department of Defense (DoD) policy guidance on the disposal of hazardous materials. This memorandum supercedes DEQPPM 79-4, "Department of Defense Hazardous Material Disposal Policy," of December 17, 1979.

BACKGROUND: DoD possesses large quantities of hazardous materials, both new items and waste products, that must be disposed of in an environmentally acceptable manner. The Resource Conservation and Recovery Act of 1976 (RCRA) and the Toxic Substance Control Act of 1976 (TSCA) require that DoD update its disposal policy regarding hazardous materials.

In 1974, DoD designated the Defense Supply Agency, subsequently renamed the Defense Logistics Agency (DLA), to be responsible "... for the disposition of items identified as unsalable because the material has no sales value . . . (except) refuse and trash . . . (and) items . . . restricted by law or military regulation." Some of the materials reassigned to DLA were hazardous, but the overall hazardous material disposal responsibility was not specifically addressed in the 1974 policy.

In December of 1979, the Deputy Assistant Secretary of Defense, Energy, Environment and Safety (DASD-EES), in coordination with the Deputy Assistant Secretary of Defense, Supply, Maintenance, and Transportation (DASD-SM&T), issued Defense Environmental Quality Program Policy Memorandum 79-4 (DEQPPM 79-4) which provided urgently needed guidance on hazardous material disposal. After the policy was issued, representatives of the military departments, DLA, and OASD(MRA&L) agreed to refine further DoD policy. This DEQPPM 80-5 includes the refinements which those representatives recommended. For purposes of this memorandum, the term DoD components refers to the military departments and all defense agencies except disposal operating entities of DLA. Other terms used in this policy are defined in Tab A.

POLICY: DoD policy is to dispose of hazardous materials in an environmentally acceptable manner:

- DLA is designated the responsible agency within DoD for worldwide disposal of all hazardous materials, except for those categories of materials specifically designated for DoD component disposal (Tab B). Specific DLA responsibilities for disposal of assigned hazardous materials are in Tab C.

- DoD components shall dispose of those categories of hazardous materials listed in Tab B. In addition, the DoD component shall support DLA disposal actions as specified in Tab D.

- The DASD(EES), in coordination with DASD(SM&T) and other OSD offices as necessary, shall formulate, implement, and monitor policy for disposal of hazardous material and shall decide any unresolved issues which may develop, including the reassignment of responsibility for disposal of specific categories of hazardous material when circumstances warrant.

- No other changes are made to the respective disposal mission responsibilities of the DoD components or DLA.

IMPLEMENTATION: This memorandum is effective immediately and should be implemented as rapidly as possible.

- DLA shall make optimum use of existing disposal capabilities and resources.

- DLA shall program for the additional resources required to discharge its responsibilities under this memorandum.

- DLA is directed to organize immediately and chair an inter-service task group to plan actions and milestones for the full implementation of this policy and submit their report to DASD(EES) within 120 days from the date of this memorandum.

- The task group will develop and promulgate a hazardous materials data call to identify current and projected hazardous materials disposal workload, as well as the actions and methodology employed to dispose of those materials. The task group should also identify, in as much detail as possible, the technical support and assistance which can be provided DLA in its efforts to insure expeditious disposal of hazardous materials in an environmentally safe manner. The task group will identify those additional resource requirements which, if made available to DLA, can be effectively applied to expedite hazardous materials disposal during FY 80 and FY 81.

SIGNED

Paul H. Riley
Deputy Assistant Secretary of Defense
(Supply, Maintenance and Transportation)

SIGNED

George Marienthal
Deputy Assistant Secretary
of Defense
(Energy, Environment and Safety)

Enclosures:

- Tab A - Definitions
- Tab B - Materials Assigned to DoD Components
for Disposal
- Tab C - Responsibilities of DLA for Disposal
of Assigned Hazardous Materials
- Tab D - Responsibilities of the DoD Components
in Support of the DLA Disposal of Hazardous
Materials.

MR/Reading/EES

P. Haviland/ds/57820/6May80

DEFINITIONS

Material is hazardous when, because of its quantity, concentration, or physical, chemical, or infectious characteristics, it may: (a) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

For the purposes of this memorandum, hazardous materials do not include those radioactive materials that the Nuclear Regulatory Commission controls. Licensees shall be responsible for the disposal of those materials per 10 CFR 20.

Hazardous material may be defined as personal property consisting of items, scrap, and waste:

- Items - All unused, used, or contaminated property or combinations of property, (unused, used, mixed or contaminated) which can be identified by a national stock number, manufacturer's part number, military specification number, or locally purchased property with a locally applied stock number. Also, that property which by military regulation requires application of a local stock number prior to disposal.
- Scrap - Used or unused property which has no value except for basic material content.
- Waste - Used or unused property, residues, by-products, sludges, and other materials, which have no known utility and must, therefore, be discarded.

Conforming storage is a facility or location which conforms to regulations of the Environmental Protection Agency and other regulatory authorities governing the storage of hazardous materials.

The generating activity is an organization or element authorized to turn-in property to the Defense Property Disposal Service.

**Materials Assigned to DoD
Components for Disposal**

DoD components shall be responsible for disposal of the following categories of hazardous materials which have not been assigned to DLA:

1. Toxicological, biological, radiological, and lethal chemical warfare materials which, by U.S. law, must be destroyed. Disposal of the by-products of such material is the responsibility of the DoD component with assistance from DLA.
2. Material which cannot be disposed of in its present form due to military regulations, e.g., consecrated religious items and cryptographic equipment.
3. Municipal type garbage, trash, and refuse resulting from residential, institutional, commercial, agricultural, and community activities, which the facility engineer or public works office routinely collect.
4. Contractor generated materials which are the contractor's responsibility for disposal under the terms of the contract.
5. Sludges resulting from municipal type wastewater treatment facilities.
6. Sludges and residues generated as a result of industrial plant processes or operations.
7. Refuse and other discarded materials which result from mining, dredging, construction, and demolition operations.
8. Unique wastes and residues of a non-recurring nature which research and development experimental programs generate.

Responsibilities of DLA
for Disposal of
Assigned
Hazardous Materials

Specific DLA responsibilities in this area shall include, but not necessarily be limited to, the following:

1. Accomplish documentation for DLA disposal actions as required under laws and regulations.

2. Initiate contracts or agreements for disposal.

3. Accept accountability for all hazardous materials except those categories specifically excluded in Tab B, which have been properly identified, packaged, labeled, and certified in conformance with established criteria.

4. Accept custody of hazardous materials within the following guidelines:

- If DLA possesses conforming storage at the defense property disposal offices (DPDO), DLA will accept physical custody at the time it accepts accountability.

- If DLA does not possess conforming storage at the DPDO, and the generating activity has conforming storage in support of mission requirements, the generating activity will retain physical custody, and DLA will accept accountability.

- In those instances where neither DLA nor the generating activity possess conforming storage, the activity with the "most nearly" conforming storage will accept or retain physical custody and DLA will accept accountability.

- DLA will be responsible for the long term programming of military construction funding for conforming storage in support of its disposal mission.

- If DLA and the component involved cannot mutually agree on the best procedure for storage and handling pending final disposal, the issue shall be referred at once to OASD(MRA&L) for resolution.

5. Provide any required repackaging or handling of hazardous materials subsequent to acceptance of accountability from the generating activity.

6. Establish an inventory control system for the types, quantities, and locations of available hazardous materials for which DLA is responsible in the event that some other activity might be able to use a particular material as a resource.

7. Provide feedback to the military departments and defense agencies on the costs associated with disposal in order that this information might serve as an economic incentive to minimize waste generation.

8. Contract for disposal technology not available in-house or from the DoD components.

9. Minimize environmental risks and costs associated with extended care, handling, and storage of hazardous materials by accomplishing disposal within a significantly compressed disposal cycle. Initiate actions and projects within DoD and in conjunction with federal civil agencies and industry to realize this objective and expedite final disposal.

10. Devise a system by which the time of turn-in will be highly visible on hazardous materials to insure proper application of resources to dispose of these materials. DLA should insure that sufficient disposal capability is programmed to preclude extended delays in the hazardous materials disposal process.

11. Establish and maintain an analysis and information distribution capability to:

- Evaluate the impact and applicability of current technological advances on DoD hazardous material disposal procedures and inform the DoD components of these developments on a continuing basis.

- Assure that the DoD components are apprised, on a continuing basis, of any federal, state, regional, and local regulations being developed to control hazardous material disposal.

12. Become the DoD focal point to recommend to DASD(EES) matters of policy and guidance for hazardous material disposal.

13. Establish procedures relative to assigned responsibility for hazardous material disposal. Unresolved issues will be forwarded to OASD(MRA&L) with appropriate comments.

14. DLA shall program to carry out their responsibilities through normal budgeting channels.

**Responsibilities of the DoD Components
in Support of the DLA Disposal of
Hazardous Materials**

1. Where feasible, minimize quantities of hazardous waste through resource recovery, recycling, source separation, and acquisition policies.

2. Provide available technical and analytical assistance, including R&D support, to DLA to accomplish disposal, if requested.

3. Provide all available information to DLA, as required, to complete environmental documentation, e.g., environmental impact statement associated with disposal.

4. Properly identify, package, label, and certify conformance with established criteria prior to transfer of accountability to DLA. Subsequent repackaging or handling is the responsibility of DLA.

5. DoD components will retain custody of hazardous materials within the following guidelines:

- If DLA does not possess conforming storage at the DPDO, and the generating activity has conforming storage in support of mission requirements, the generating activity will retain physical custody, and DLA will accept accountability.

- In those instances where neither DLA nor the generating activity possesses conforming storage, the activity with the "most nearly" conforming storage will accept/retain custody.

- If DLA and the component involved cannot agree on the best procedure for storage and handling pending final disposal, the issue will be referred at once to OASD(MRA&L) for resolution.

- When a DoD component retains custody of a hazardous material, this hazardous material shall be kept on the accountable records of DLA.

6. When requested, the DoD components will assist DLA by providing information and comments on federal, state, regional, and local regulations being developed to control hazardous material disposal, e.g., ability of particular installations to comply and impact on DoD. The DoD components will alert DLA to any local situation which could impact on hazardous materials disposal.

7. DoD components shall program to carry out their responsibilities through normal budgeting channels.



MANPOWER
RESERVE AFFAIRS
AND LOGISTICS

APPENDIX 1.4
OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D C 20301

21 OCT 1980

DEFENSE ENVIRONMENTAL QUALITY PROGRAM POLICY MEMORANDUM (DEQPPM) 80-8

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (IL&FM)
ASSISTANT SECRETARY OF THE NAVY (MRA&L)
DEPUTY UNDER SECRETARY OF THE NAVY
ASSISTANT SECRETARY OF THE AIR FORCE (MRA&I)
ASSISTANT SECRETARY OF THE AIR FORCE (RD&L)
DIRECTORS OF DEFENSE AGENCIES

SUBJECT: RCRA Hazardous Waste Management Regulations

PURPOSE: This is to provide additional policy guidance to implement within the Department of Defense the hazardous waste management regulations of the Resource Conservation and Recovery Act (RCRA) of 1976.

BACKGROUND: On May 19, 1980, the Environmental Protection Agency (EPA) published implementing instructions to Subtitle C of RCRA which established a federal program to provide comprehensive regulation of hazardous waste. When fully implemented, this program will provide "cradle-to-grave" regulation of hazardous waste.

The Department of Defense is an entity responsible for determining when a material becomes a waste subject to RCRA Regulations. Applying the criteria set forth in Subparts C and D of 40 CFR Part 261 further qualifies the waste as hazardous at which point the RCRA Regulations become effective. Also, RCRA establishes standards for generators and transporters of hazardous waste that will ensure proper record-keeping and reporting, the use of a manifest system to track shipments of hazardous waste, the use of proper labels and containers, and the delivery of the waste to properly permitted treatment, storage, and disposal facilities. To ensure that these facilities are designed, constructed, and operated in a manner which protects human health and the environment, the regulations promulgate technical, administrative, monitoring, and financial standards for them. EPA will use these independently enforceable standards to issue permits to owners and operators of facilities.

Also in May, 1980, Defense Environmental Quality Program Policy Memorandum 80-5 was published to provide DoD policy on the disposal of hazardous materials. That policy designates the Defense Logistics Agency as responsible for the disposal of all hazardous materials except those that specifically remain the other DoD components' responsibilities.

POLICY: The DoD policy is:

- To limit the generation of hazardous waste through alternative procurement practices and operational procedures that are attractive environmentally yet are fiscally competitive,
- To reutilize, reclaim, or recycle resources where practical and thus conserve on total raw material usage,
- To exhaust all other actions mandated by Federal statutes or regulations prior to identifying the material as discardable,
- To dispose of hazardous waste in an environmentally acceptable manner according to the disposal policy established in DEQPPM 80-5,
- To implement within DoD the hazardous waste management regulations that EPA published under Subtitle C of RCRA or that states enact under EPA authorization,
- To consider all unused hazardous materials as not regulated under RCRA until a decision is made to discard them, and
- To insure that all used hazardous materials are safely handled, accounted for, and controlled by internal DoD documentation. The internal controlling documentation will be applied to all movement among DoD activities and will reflect all data elements prescribed for auditing purposes and for shipping manifests as required by EPA or the states. The DoD component/entity assigned disposal responsibility by DEQPPM 80-5 will advise the using activities as to which "used" hazardous material must be controlled as a hazardous waste.

ACTION REQUIRED: DoD components will:

- Reduce hazardous waste generation to the maximum extent practical,
- Reutilize, reclaim, or recycle resources where practical, and
- Implement EPA hazardous waste management regulations.

As part of that implementation, any DoD installation that generates or transports hazardous waste or owns or operates a facility that treats, stores, or disposes of hazardous waste will notify EPA regional administrators as required. Each installation will obtain one EPA identification number. That identification number will be used for all subsequent reports and permit applications required for the installation.

Also, any installation which owns, operates, or proposes to own or operate a facility that treats, stores, or disposes of hazardous waste will apply for a permit from EPA or the state. That application is in two parts:

- Part A, which defines the process to be used, the design capability, and the hazardous waste to be handled, must be submitted by November 19, 1980.
- Part B, which contains more detailed information intended to establish that the facility can meet the technical standards that RCRA promulgated, must be submitted at a date that the regional administrator sets.

The installation commander will sign the permit application as the facility owner, and the operational manager of the permitted facility will sign the permit application as the operator. DLA or other tenants will sign as operation manager for all functions for which they have been assigned responsibility under DEQPPM 80-5. Each installation that requires a permit will submit one EPA Form 3510-1 for the installation (Form 1 - General Information) and an EPA Form 3510-3 for each permitted facility (Form 3 - Hazardous Waste Permit Application).

Implementation of the comprehensive hazardous waste management program mandated by RCRA requires maximum cooperation of all activities on an installation. The installation commander is responsible to ensure compliance with all RCRA requirements for the installation. The installation commander is responsible to notify, to apply for permits, and to report to EPA or the state, as required, for all installation activities, including tenants. The individual facility operational managers are accountable for conducting their activities in accordance with RCRA. Those facility managers, including supporting property disposal activities and tenant activities, will provide necessary documentation to the installation commander for permit application, will provide to the installation commander reports required by EPA or the state, and will ensure compliance with RCRA regulations and permit requirements at that facility. All reports to EPA or the state will be co-signed by the installation and facility operator or their designated officials.

For facilities that DoD owns but does not operate, the DoD component that owns the facility is responsible as the owner for purposes of the permit. For example, on an Army government-owned, contractor-operated plant, the contractor may be the applicant for the permit, but the local Army commanding officer is still responsible to ensure compliance.

DoD components will use the Disposal Turn In Document (DTID) or a bill of lading, as appropriate, modified to meet the EPA requirements, for the shipping manifest. The shipping activity, either servicing property disposal activity or facility operator, will manifest any shipment of hazardous waste off the installations in accordance with RCRA. The responsibility for tracking the manifest terminates at the permitted facility destination for that shipment; however, the shipper must obtain a copy of the completed manifest to show arrival at that destination. For shipments among DoD components, whether on the same installation or between installations, the turn-in activity's responsibility terminates upon receipt of a signed copy of the Disposal Turn In Document (DTID) or the govern-

ment bill of lading which serves as the internal manifest between the generator, the servicing DPD0, or other permitted receiver.

Each DoD component will take immediate action to identify all resources required to achieve full compliance with EPA and state regulations. Those resources will then be addressed, within program decision memorandum approved overall component resource levels, in future budget submissions.

An installation that requires permits for more than one program (RCRA, Safe Drinking Water Act, Clean Water Act, and Clean Air Act programs) is encouraged to consolidate its application, if possible, under EPA's consolidated permit program.

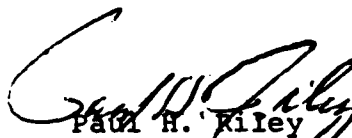
In special circumstances, and where it is mutually agreed among the installation, tenant, and EPA/State, exceptions to the above policies will be documented by the DoD component concerned and forwarded to DASD(EES) for approval.

The DASD(EES), in coordination with DASD(SM&T) and other OSD offices as necessary, shall monitor policy implementation for RCRA hazardous waste management, and shall decide any unresolved issues which may develop.

This memorandum is effective this date. Progress toward implementation of this memorandum and the RCRA hazardous waste regulations will be included in the environmental management-by-objective (MBO) semi-annual reports.



George Marienthal
Deputy Assistant Secretary of Defense
(Energy, Environment and Safety)



Paul H. Riley
Deputy Assistant Secretary of Defense
(Supply, Maintenance and Transportation)

CHAPTER XXI

HAZARDOUS PROPERTY MANAGEMENT

A. GENERAL

1. The purpose of this chapter is to provide DoD installations and DLA personnel with guidance for handling, processing, and disposing of hazardous property, in accordance with applicable environmental and other pertinent laws and regulations.

2. The DoD policy is to store and dispose of all hazardous property in an environmentally acceptable manner in accordance with applicable environmental and other pertinent laws and regulations.

3. For definitions see Attachment 1 and Chapter III, this manual.

B. RESPONSIBILITIES

1. DoD installation responsibilities are as follows:

a. Where feasible, minimize quantities of hazardous property through resource recovery, recycling, source separation, and acquisition policies.

b. Provide available technical and analytical assistance, including research and development support, to DLA to accomplish disposal, if requested.

c. Provide all available information to DLA, as required, to complete environmental documentation; e.g., environmental impact statements associated with disposal.

d. Properly identify, package, label and certify conformance with established environmental and transportation criteria prior to transfer of accountability for hazardous property to DLA.

e. When requested, assist DLA by providing information and comments on federal, state, regional, and local regulations being developed to control hazardous property disposal; e.g., ability of particular installation to comply and impact on DoD. Alert DLA to any local situation which could impact hazardous property disposal.

f. Retain physical custody of hazardous property within the guideline provided in paragraph C, this chapter.

g. Provide for disposal of the following categories of hazardous property:

(1) Toxicological, biological, radiological, and lethal chemical warfare materials which, by U.S. law, must be destroyed. Disposal of the by-products of such

material is the responsibility of the DoD installation with assistance from DLA.

(2) Material which cannot be disposed of in its present form due to military regulations; e.g., Ammunition, Explosives and Dangerous Articles (AEDA), controlled medical items. This category would include those instances where military regulations require the obliteration of all markings that could relate an excess material to its operational program. Once the appropriate actions are taken to meet the military regulation, the resulting material could then be turned in to the servicing DPDO.

(3) Municipal-type garbage, trash, and refuse, resulting from residential, institutional, commercial, agricultural, and community activities, which can be disposed of in a state or locally permitted sanitary landfill.

(4) Contractor generated materials which are the contractor's responsibility for disposal under the terms of the contract.

(5) Sludges resulting from municipal-type waste-water treatment facilities.

(6) Sludges and residues generated as a result of industrial plant processes or operations. Properly identified industrial process sludges and residues which are not commingled or a product of an industrial waste treatment facility are the responsibility of DLA. DLA does not take sludges and residues from waste water treatment facilities. DLA does take sludges and residues from industrial processes that have not been commingled. For example, sludges and residues from industrial process "A" must be collected and stored separately from sludges and residues resulting from industrial process "B". Each process may result in sludges and residues that contain a mixture of ingredients and contaminants but the sludges and residues from each process must be collected and stored separately and not commingled.

(7) Refuse and other discarded material which result from mining, dredging, construction, and demolition operations.

(8) Unique wastes and residues of a nonrecurring nature which research and development experimental programs generate.

2. The DLA responsibilities are as follows:

a. Accomplish documentation (including records, for DLA disposal actions as required under applicable

XXI-1

environmental and other pertinent laws and regulations.

b. Initiate contracts or agreements for DLA disposal actions.

c. Accept accountability for all hazardous property, except those categories under responsibility of DoD installations (paragraph B1 above) which have been properly identified, packaged, labeled, and certified in accordance with environmental and transportation laws and regulations.

d. Accept sludges and residues from industrial processes that have not been commingled, e.g., sludges and residues from industrial process "A" must be collected and stored separately from sludges and residue resulting from industrial process "B".

e. Accept custody of hazardous property within the guidelines provided in paragraph C, this chapter.

f. Program for construction of storage facilities in support of the DLA disposal mission.

g. Provide any required repackaging or handling of hazardous property subsequent to acceptance of accountability from the turn-in activity.

h. Establish an inventory control system for the types, quantities, and locations of available hazardous property for which DLA is responsible in the event that some other activity might be able to use particular property as a resource.

i. Provide an economic incentive for DoD installations to segregate and minimize waste generation by:

(1) Providing feedback to military departments and defense agencies on the costs associated with destruction of HW.

(2) Providing 100 percent reimbursement to DoD installations with qualified recycling programs for hazardous wastes sold by DLA for recycling in accordance with DoD policy.

j. Contract for disposal technology not available within the DoD.

k. Minimize environmental risks and costs associated with the extended care, handling, and storage of hazardous property by accomplishing disposal within a significantly compressed disposal cycle. Initiate actions and projects within DLA and in conjunction with federal, state and local agencies and industry to realize this objective and expedite final disposal.

l. Operate a system to ensure that sufficient disposal capability is programmed to preclude extended delays in the hazardous property disposal process.

m. Maintain an analysis and information distribution capability of current technological advances on DoD hazardous property disposal procedures and advise DoD installations of such developments on a continuing basis. Additionally, ensure that DoD installations are apprised of any federal, state, regional, and local regulations being developed to control hazardous property disposal.

n. Serve as the DoD focal point to recommend to OASD matters of policy and guidance for hazardous property disposal.

o. Establish procedures relative to assigned responsibility for hazardous property disposal. Unresolved issues will be forwarded to OASD with appropriate comments.

C. RESERVED

D. TURN-IN PROCEDURES (GENERAL)

DoD installations and DLA are responsible for compliance with environmental and other pertinent laws and regulations. In order to ensure environmental compliance turn-in activities and DPDOs will:

1. Preplan, schedule, and coordinate hazardous property turn-ins.

2. Process turn-ins of hazardous property as follows:

a. Identification

(1) NSN-identified hazardous property.

(a) The turn-in activity will provide the following upon turn-in of NSN-identified hazardous property to the DPDO:

1. Valid NSN.

2. Noun name as cataloged in the supply system.

3. Chemical name of hazardous contaminants and noun name of nonhazardous contaminants.

4. Amount of hazardous and nonhazardous contaminants based on user's knowledge or testing of the item expressed in a range of content by percentage or parts per million as applicable.

(b) When necessary, the DPDO will:

1. Search HMIS and/or other data sources for chemical names of hazardous components.

2. Search HMIS for transportation and other data as required.

3. Contact manufacturer for data as required.

(2) LSN/FSC-identified property.

(a) The turn-in activity will provide the following for turn-in of hazardous property to the DPDO:

1. Chemical name of hazardous components.
2. Chemical name of hazardous contaminants and noun name of nonhazardous contaminants.
3. Amounts of hazardous and nonhazardous contaminants based on user's knowledge or testing of the item expressed in a range of content by percentage or parts per million as applicable.

(b) The DPDO will:

1. Accept accountability of property identified in the above manner.
2. Accept physical custody in accordance with paragraph C, this chapter.
3. Assign proper DoT shipping description to item received from on-site or for property that is received in-place and is not transported over public highways.
4. Assist turn-in activity in determining proper identification as capabilities permit.
5. Reject turn-in when proper identification in accordance with the above is not provided.

(3) PCBs. An analysis of PCB concentration as determined by a scientifically acceptable analytical method will accompany the DTID unless the property has a manufacturer's label or nameplate that indicates the presence of PCBs; e.g., generic or commercial name. The analysis will indicate the amount of PCB in parts per million (ppm) or in the following ranges:

- a. Less than 50 ppm
- b. 50-499 ppm
- c. 500 ppm or more

Individual analysis is required for each item. Items such as capacitors which do not have sampling or servicing parts and are sealed by the manufacturer and are suspected to contain PCBs will be turned in as PCB items (500 ppm and over) without analysis. DPDS may accept batch testing results of mineral oil dielectric on a case-by-case basis. However, approval for batch testing will be obtained from DPDS prior to turn-in.

b. Packaging.

(1) Property turned in to the DPDO must be in containers that are non-leaking and safe to handle.

The containers must be able to withstand normal handling or the turn-in will be rejected.

(2) DoT specified containers are required for storage and movement of hazardous wastes. These wastes may also be accumulated in bulk in RCRA permitted facilities.

(3) DoT specified containers are not required for turn-in to the DPDO of anything other than the hazardous wastes. The transporting agency does have a responsibility to comply with DoT requirements for transport over public highways.

(4) When hazardous property turned in for disposal is packaged in the original military containers, the turn-in activity will provide the DPDO with a certification as to the true condition/reliability of the containers. The certification will be placed in Block Y of the DTID by the turn-in activity and will contain one of the following statements:

(a) Packaged in accordance with DoT 49 CFR 170-189.

(b) Packaging equals/exceeds DoT 49 CFR 170-189.

(c) Packaging is substandard to DoT 49 CFR 170-189 (this is not acceptable for hazardous waste "HW" or off-site hazardous property turn-ins).

(5) DoD property in foreign countries or territories shall be packaged in accordance with the host country's environmental laws and/or status of force agreements.

c. Labeling.

(1) Hazardous property will be labeled in conformance with established environmental and transportation laws and regulations.

(2) PCB marking requirements are as prescribed by the EPA in 40 CFR 761.45. Items containing 50 ppm or more PCB must be marked, with the exception of transformers. Only PCB transformers, i.e., 500 ppm or more PCB, must be marked.

d. Disposal Turn-In Document (DTID).

(1) All property turned in to the DPDO will be done so with a properly prepared DTID. Standard procedures for preparation of a DTID are found in DoD 4140.17-M MILSTRIP. In addition, insert "HM" in block C if turn-in is hazardous material or "HW" if hazardous waste.

(2) The DTID will be modified to satisfy internal DoD auditing requirements. Where they exist, State/EPA required shipping manifests will be used in addition to the modified DTID for transporting haz-

ardous wastes. Information required on the State/EPA manifest must be completed by the turn-in activity when transporting hazardous wastes off-site and over public highways to a servicing DPDO.

(a) Block A - "Shipped From": add telephone number and EPA identification number. Installations qualifying as RCRA defined "small quantity generators" will enter "small generator exclusion" in lieu of the EPA identification number.

(b) Block B - "Ship To": add telephone number and EPA identification number.

(c) Block U - "Freight Classification Nomenclature": add Hazard Class (maximum 18 alpha characters) and six character (2 alpha, 4 numeric) identification number as shown in DoT 49 CFR 172.

(d) Blocks W-X.

1. For non-NSN hazardous waste items enter the word 'waste' and the item's proper shipping name as shown in DoT 49 CFR 172 and as much descriptive information as possible in Blocks W and X, and/or attach additional documentation with this data.

2. For NSN hazardous waste items Block W will be used for internal purposes and Block X must contain the word "waste" followed by the item's proper shipping name as shown in DoT 49 CFR 172.

(e) Block Y - Use this Block (in lieu of blocks AA through EE) for the deposit account number. Note: This is not an entry required on behalf of hazardous property documentation but a movement of data prescribed to permit use of the previously identified blocks for other purposes.

(f) Blocks AA and BB - Use these two blocks for the transporter's name and EPA identification number.

(g) Block CC - Have transporter (identified in Blocks AA and BB) sign and date for shipment received.

(h) Blocks DD, EE, FF and CC - Insert the following statement in these blocks (Note: Rubber stamped, typewritten or machine-produced copy required): "This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of DoT and EPA." To comply with RCRA, the turn-in activity will sign as the generator under the certification statement.

(i) Block-2. Enter DoT container classification.

(j) Block-3. Enter total quantity of hazardous waste by units of weight or volume (includes packaging).

(3) Block 8 of the DTID will be signed and dated by the DPDO and returned to the turn-in activity within 5 working days from receipt. The signed copy of the DTID will serve as valid receipt of accountability for the hazardous property by the DPDO.

E. TURN-IN PROCEDURES (SPECIFIC).

Detailed guidance governing turn-in as well as handling and processing of specific hazardous property is contained in Chapter VI, this manual.

F. IMPLEMENTATION OF RCRA.

1. Permits.

a. The installation commander is responsible to ensure compliance with all RCRA requirements for the installation. The installation commander is also responsible to notify, to apply for permits, and to report to EPA or the state, as required, for all installation activities, including tenants. Tenants are responsible for conducting their activities in accordance with RCRA and permit requirements at the facility. Tenants will provide necessary documentation, signed and completed, to the host for permit applications and for reports as required by EPA or the state. Submittals will be in the format required by the regulatory agencies.

b. The individual facility operational managers are responsible for conducting their activities in accordance with RCRA. Those facility managers, including tenants, will provide necessary documentation to the installation commander for permit applications, will provide to the installation commander reports required by EPA or the state, and will ensure compliance with RCRA regulations and permit requirements at that facility.

c. The installation commander will sign as the owner and the Defense Property Disposal Region Commander will sign as the operator.

2. Hazardous Waste Management Plan.

Implementation of the comprehensive hazardous waste management program, mandated by RCRA, requires maximum cooperation of all activities on an installation. The following guidance applies to development and implementation of a Hazardous Waste Management Plan:

a. The installation commander is responsible for developing and implementing a Hazardous Waste Management Plan to include all tenants on the in-

stallation. This plan shall identify and implement hazardous waste management actions required by RCRA. Tenants are responsible for providing input to the installation commander for their portion of the plan.

b. All tenants will comply with applicable portions of the Hazardous Waste Management Plan and ensure that internal operational procedures are consistent.

c. Reserved.

d. Reserved.

e. Reserved.

3. Manifesting.

When required by EPA and/or State RCRA derived regulations, a manifest will be prepared in addition to the modified DTID in accordance with paragraph D2d(2) above. The permit holder (installation commander) has primary responsibility for signing manifests, but may delegate signature authority. However, the DPDO will co-sign all manifests for shipments of hazardous property on DLA accountable records. In those instances where the permit holder delegates signature authority to the DPDO, only one signature will appear.

4. Record Keeping and Reporting.

Installations shall comply with federal and state hazardous waste record keeping and reporting requirements. Tenants shall submit reports required by the installation's Hazardous Waste Management Plan within time frames established by the installation commander. All reports to EPA or the state will be prepared in proper format by the operators and co-signed and submitted by the installation commander.

G. HAZARDOUS MATERIALS INFORMATION SYSTEM (HMIS)/HAZARDOUS MATERIALS TECHNICAL CENTER (HMTTC)

1. DoD Instruction 6050.5, Hazardous Material Information System, assigns responsibilities for the establishment and use of a DoD hazardous material information system.

2. The HMIS is designed to support the major areas of health, safety, and transportation. This includes a wide range of data related to safety, health, transportation, and disposal of hazardous materials. Caution should be exercised in applying this information without the proper training and knowledge of procedures which are related to specific hazards. Data in this system is reference information and must be used in conjunction with, not in lieu of, procedures and regulatory documents. If there is any doubt about use of the safety and health information in the microfiche, the local health and safety staff should be contacted.

3. HMIS data are published on microfiche annually with quarterly cumulative updates. Items on the list are identified by NSN, Manufacturer, and Part Number (Trade Name) and are sequenced by NIIN.

4. HMTTC is a DLA managed, contractor operated information source for technical information on safety, health, handling, transportation, disposal and environmental aspects of hazardous materials management. HMTTC maintains a telephone response capability for DoD use in accessing this information.

Telephone numbers are: (800) 638-8958
(301) 468-8858
FTS (202) 468-8858

CHAPTER XXI

ATTACHMENT 1

DEFINITIONS

1. *Hazardous Property.* Includes material and waste having one or more of the following characteristics:

a. has a flashpoint below 200° F (93° C) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control;

b. has a Threshold Limit Value* equal to or below 1,000 ppm for gases and vapors, below 500 mg/m³ for fumes, and equal to or less than 30 mppcf or 10 mg/m³ for dusts (less than or equal to 2.0 fibers/cc greater than 5 micrometers in length for fibrous materials);

c. a single oral dose that will cause 50 percent fatalities to test animals when administered in doses of less than 500 mg per kilogram of test animal weight;

d. is a flammable solid as defined in DoT 49 CFR 173.150, or is an oxidizer as defined in DoT 49 CFR 173.151, or is a strong oxidizing or reducing agent with a half cell potential in acid solution of greater than ± 1.0 volt as specified in Latimer's table on the oxidation-reduction potential;

e. causes first-degree burns to skin in short-time exposure, or is systemically toxic by skin contact;

f. in the course of normal operations, may produce

dust, gases, fumes, vapors, mists, or smoke with one or more of the above characteristics;

g. produces sensitizing or irritating effects;

h. is radioactive;

i. the item has special characteristics which in the opinion of the manufacturer could cause harm to personnel if used or stored improperly;

j. the item is hazardous in accordance with OSHA 29 CFR 1910;

k. the item is hazardous in accordance with DoT 49 CFR 171-179 or the International Maritime Dangerous Goods Code of the International Maritime Organization (IMO) or the Dangerous Goods Regulations of the International Air Transport Association (IATA); or

1. is regulated by the Environmental Protection Agency under 40 CFR.

2. *Hazardous Wastes.* Property which is regulated as a hazardous waste under the Resource Conservation and Recovery Act and subsequent legislation, including state and local regulatory authorities.

3. *Hazardous Material.* Any hazardous property which is not a hazardous waste.

U.S. GOVERNMENT PRINTING OFFICE: 1985 461 164 10103

XXI-A-1

APPENDIX 2.0 SELECTED REFERENCES

- 2.1 Innovation: The Tough Requirement (GEN Wickham, January-February 1985)
- 2.2 FTAT Program, A Technology Transfer Vehicle (Leverenz, August 1985)
- 2.3 FTAT Fact Sheet: Indoor Vehicle Platform Retrofit (CERL, March 1984)

INNOVATION: The Tough Requirement

By Army Chief of Staff GEN John A. Wickham, Jr.



We are living in a rapidly changing and hostile world. New technologies are developing faster than our materiel acquisition process is able to integrate them. Demographic trends are yielding a shrinking manpower pool from which we must compete for quality recruits. At the same time, economic cycles—often driven by dwindling natural resources—are intensifying political tensions around the world. Thus, the threats that present challenges to the United States Army are more diversified and more sophisticated. Faced with these changes and threats, how will the Army be successful?

At the moment, the Army is undergoing the most extensive modernization effort in its history. That effort contains the products of past innovation such as turbine engines for the M1 tank, night vision devices for soldiers and equipment, extensive adaptation of electronics and computer technology for C3I systems, light infantry divisions, and the high-tech division to name just a few. However, more innovation will be required in order to meet the challenges of the future, especially to develop our doctrine, organizations, tactics, training, materiel and leaders. We must stretch the benefits of all the resources that are entrusted to our care to achieve the maximum return on our investment.

With any bureaucracy institutional dilemmas exist in the Army that tend to dampen our ability to innovate successfully. This article, using Army aviation as an historical example, examines the process of innovation

and suggests some approaches for overcoming the debilitating effects of these dilemmas. As we proceed, we should keep in mind the following quotation from the book, *In Search of Excellence*: "The new idea either finds a champion or dies . . . No ordinary involvement with a new idea provides the energy required to cope with the indifference and resistance that major technological change provokes . . . Champions of new invention display persistence and courage of heroic quality."

The Lessons of History

In 1983, my predecessor and I decided to organize a new combat branch—Army Aviation. This event completed a process of innovation that began in World War I and that had to overcome numerous challenges along the way. The first challenge was how to observe artillery fire from the air. The end of World War I found aerial observation in the military services at a crossroads. The hydrogen-filled, captive balloon was to be phased out because it was vulnerable to attack by hostile fighters and anti-aircraft fire.

Having bought its first airplane in 1909, the Army developed the fixed-wing aircraft for aerial observation on the battlefield. The Army Air Corps was created in 1926, and it furnished the planes and pilots while field artillery units provided the air observers to adjust artillery fire. Doctrine specified that artillery observation planes should be attached to Corps headquarters, and they would provide

direct support to subordinate units on a mission-by-mission basis.

The doctrine had serious shortfalls. For example, the requirement for aircraft to have secure, hard surface runways meant that airfields were located at long distances from the front lines. Thus, responsiveness to combat units was usually slow. Upon arriving at the front lines, the air observer then had to locate the guns and enemy targets—using additional precious time—when time-on-station for target acquisition was limited in any case. These deficiencies were well known, and they inspired much complaining but little else. The inertia of the "system" was stifling the needs of the users. There was no real champion for a new idea—nor were there any resources.

However, with the outbreak of World War II, a champion and the resources emerged. Field artillery units were desperate for better observation of artillery fire from the air. Their clamor attracted the attention of the civilian aircraft manufacturers of that era. Being aggressive businessmen, they entered the "marketplace" and placed civilian aircraft (with company pilots) at the disposal of senior field commanders in every large-scale Army maneuver conducted during 1940 to 1941.

During maneuvers, the old way of doing business was invalidated. Instead, the observation aircraft landed at field headquarters sites, well forward on the battlefield, rather than distant airfields in the rear. Response to the front-line combat units improved significantly. Inevitably, the

idea began to emerge: why not make air observation organic to field artillery units?

The Air Corps "experts" were opposed to such a heretical idea. Opponents claimed that the field artillery couldn't fly planes from roads and small fields; if they could, they couldn't perform maintenance in the field; and, even if they could fly and maintain the planes, they'd be shot down the first day that they flew in battle. The Air Corps was not about to let the air observation mission slip from *its* hands. They were out to protect their "turf." The "system" was still attempting to prevail over the needs of the users.

Despite strong opposition, the idea of organic air observation for field artillery units would not die. The field commanders who had been well served during the maneuvers were enthusiastic in their support. Air observation for field artillery fire support was a combat multiplier that was not going to go away.

The outbreak of World War II created a sense of urgency and provided the impetus for change. The chief of field artillery soon tested at Fort Sill the applicable doctrine, tactics and maintenance. Test personnel consisted primarily of volunteer field artillery officers and enlisted personnel having civilian pilot licenses.

The aircraft manufacturers sent experienced people to help. The tests proved that artillery units needed organic aircraft, pilots, and observers. Fire support on the battlefield was about to take a measurable step forward. On June 6, 1942, the War Department issued a directive establishing "Organic Air Observation" for the field artillery.

What did it take? It took people willing to be champions of a new idea, innovation in the field, industry-Army partnership, flexible minds and organizations, persistence, and courage. All these factors were critical to success, but it still took over 20 years to overcome the inertia of the "system."

While World War II proved the value of Army aviation in support of the ground forces, the Korean War extended those concepts and proved

that aviation's potential was almost unlimited. With the introduction of newer airplanes and helicopters, the Korean battlefield spawned new ideas about air mobility and aerial medical evacuation. Yet, when the notion of helicopter fire support emerged, the "system" again was tough to overcome.

After the Korean War, various experiments, mostly unsuccessful, were conducted using armed helicopters. In December 1956, discouraged by unfavorable reports, the commander of the Army Aviation School asked COL Jay D. Vanderpool to undertake a special project to build and test weapons for use on armed helicopters.

Vanderpool started out with a few helicopters, a few rockets, and no gunsights. His biggest asset was a group of people who believed enough in the concept of armed helicopters to give up their evenings and weekends for the project. These aviation pioneers were called "Vanderpool's Fools," but they planted and nurtured the seeds that gave birth to our current family of armed helicopters.

Similarly, in the early 1960s, responding to the infantryman's lack of tactical mobility, the Howze Board was formed by Department of the Army to consider how to exploit fully the potential of rotary-wing aircraft.

As a result of the Howze Board, we formed the experimental 11th Air Assault Division (Test) which later became the 1st Cavalry Division (Airmobile). Air mobility became more and more important. By the late 1960s, no major battle was fought in Vietnam without helicopters providing transport, reconnaissance, surveillance, communications, medical evacuation, resupply, and firepower.

Our Army, by overcoming substantial internal resistance, had led the world in the development of air mobility and the use of helicopters. The prevailing factors behind this long-term process of innovation are classic teaching points to study as we strive to encourage innovation in today's Army.

First, innovation had to be mission-oriented. The innovative ideas

came from the users in the field. New ideas were developed by those who understood the demands of the battlefield, and these ideas had to be tested and validated against those same standards.

This important factor is found in battlefield innovations performed by soldiers in today's Army and by our allies. As examples, there are Rangers, who parachuted into Grenada from 500 feet and turned the Cubans' own anti-aircraft guns against them; the British, who had to improvise an aircraft carrier out of a cargo ship during the Falklands War; and the Israelis who had to use remotely piloted vehicles and drones in the Lebanon War to conserve their pilots and aircraft.

Users are where the action is. They are usually younger, more imaginative, and less cautious; they have the most incentive to overcome the problems that make their jobs harder and reduce their chances of survival in combat.

Second, command climate—this was key—had to be supportive. Where the pressure existed for zero defects, no mistakes, and strict adherence to dogma, when we see that innovation languished. But in a supportive climate, we see that innovation flourished. A supportive climate let "Vanderpool's Fools" understand that their work made a difference. They realized not only that they could innovate, but also that they had to innovate. They were sheltered while their ideas grew. The typical bureaucratic concerns of "lead time," "coordination," "standardization," and so forth were somehow managed until innovation could flourish.

Third, the school system had to play a crucial role in the process. Innovation does not necessarily have to occur in the schools—often it will not. But schools must teach the fundamental competence that soldiers need to perform their jobs. The ability to innovate requires knowledge and experience. Innovation cannot spring from ignorance. And, schools must foster an innovative spirit so that our users cease imitating and make use of their imaginations.

Finally, those who pushed for change had to resist the temptation to rest on past laurels. The aviation champions were never satisfied. They kept developing the potential of aviation. They were irreverent, in a sense, because they refused to accept the conventional wisdom. They kept looking for a better way. In doing so, they developed a combat capability that is integral to the combined arms team in today's Army.

Overcoming Institutional Dilemmas

These examples from Army aviation demonstrate that we can find innovative solutions to military problems and enhance our combat capabilities. But, why is innovation the tough requirement? The answer, it seems to me, is wrapped up in three institutional dilemmas that we—and institutions like the Army—must face. These dilemmas tend to make innovation difficult; thus, we must learn to dominate them. While the dilemmas will never be completely resolved, the payoffs will be significant for any progress we accomplish.

The Materiel Acquisition Dilemma

In a rapidly changing environment, the technologies are evolving faster than our development and acquisition process can produce military materiel. On the one hand, there is a temptation to modify each item so that it is updated with the latest high-tech innovations. On the other hand, we recognize that continually changing requirements result in equipment that is never fielded and excessively expensive. How should we deal with this dilemma?

Simply stated, we must shorten the acquisition cycle. The Army and its contractors, as a team, must pay the price up front. We must construct the proper contracts with adequate funding to generate many alternative concepts.

We must get our soldiers and units involved early in the process. We must strengthen the contacts between our R&D labs and our users so

that we focus on soldier needs. We must get more of the contractor engineers in the field (as the aircraft manufacturers did) to find the best solutions and to "cross-fertilize." This is where, for example, innovative concepts of composite technology in the aviation industry can be applicable to making Army equipment lighter, and therefore more deployable tactically as well as strategically.

We must get more users into the program manager staffs to keep our efforts on course. We must terminate "failures" early (without recrimination) and shift resources to reinforce our successes. And, there will be times when military, contractor, and elected officials must "take the heat" of bad publicity for justified "failures" to protect the "Vanderpool's Fools" while they do their work.

The Organizational Dilemma

User orientation and resultant innovation require responsive organizations. This tends to mean that we need more informal structure than formal, horizontal structure rather than vertical, streamlined headquarters rather than staff heavy, and top leadership knowledgeable and in touch with the action rather than insulated by multiple levels of command and staff. The intent is to shift the focus toward the requirements of the users rather than the "system."

Yet, the Army (and government) has structured its organizations to accomplish their missions in a way which is almost diametrically opposed to these characteristics. We are oriented on the demands of combat, which require multiple echelons of command and staff oversight. We are also responsive to our appointed and elected leaders, whose responsibility demands investigative oversight and control.

How can we meet the challenge of establishing an innovative environment and still retain the command and control that is mandated by the demands of combat and by law?

We must adjust our organizations to leverage the personal contact of our leaders with their soldiers.

Napoleon once said, "The personality of the general is indispensable." We must look for ways to reduce our staffs and push the talent and responsibility downward, and we must reduce the number of decision makers that must reach a consensus. Otherwise staff hegemony can develop which tends to obliterate leadership and generalship. We must guard against the harmful effects of "protecting turf" when it is not in the best interests of the user.

The Standardization Dilemma

Innovation is generated and thrives in a non-standard environment. Different units might have different tactics, procedures, and materiel. Yet military experience and economy must favor standardization of doctrine, tactics, equipment, organizations, and training methods. How can we encourage doctrinal and tactical innovation in our units without overturning the essential standardization which makes us able to function effectively in combat?

The Army must relook its requirements for standardization continually, because while we gauge our adversaries they must not be allowed to gauge us. We must eliminate standardization for its own sake and retain only that which is necessary. Standardization tends to prevent the development of individuality and independent spirit.

We must capture the benefits of the newest information, manufacturing, materiel handling, and transportation technologies to make our support systems more flexible and responsive. In short, we must remember these words of MG J. F. C. Fuller: "The more mechanical become the weapons with which we fight, the less mechanical must be the spirit which controls them."

So the real challenge of innovation is always to find a better way to do business—better tactics and doctrine, better organizations, better equipment, better leadership, and better work and family environments. We must "be all that we can be." The Army's success on future battlefields will depend on our will and ability to meet this challenge.

FTAT Program

A Technology Transfer Vehicle

By Dr. Donald J. Leverenz

RESearchers at the Army Corps of Engineers laboratories are continually evaluating and developing new technologies in energy conservation; facility maintenance, repair, and modernization; and environmental quality. Much of this technology is ready to be used at Army installations. The Facilities Technology Applications Tests (FTAT) program is designed to transfer technology from the research environment to Army users in the Directorate of Engineering and Housing (DEH) at Army installations.

Demonstrations as a Technology Transfer Method.—Many of the new, cost-effective technologies developed by Corps laboratories are not being used largely because installation managers are unaware of them. The intent of the FTAT program is to demonstrate proven technologies before an audience of potential Army users; other such users include contractors who provide engineering and maintenance services to the DEH. Personnel from nearby DEH installations are encouraged to attend special showings of the technology in use or to participate in workshops at the demonstration site. They can then apply the technology at their own installations.

The publication of information on technology demonstrations is another important aspect of the technology transfer process. Articles on demonstration activities are published periodically in newsletters sent to DEH personnel and in other Army publications. Videotapes of many FTAT technologies are being prepared for training purposes and to publicize them.

Sponsorship of FTAT.—The Facilities Engineering Division, Office of the Assistant Chief of Engineers

(OACE), is the Department of the Army proponent and sponsor of the \$29 million FTAT program. The Directorate of Research and Development in the Office of the Chief of Engineers conducts the program. FTAT demonstrations are carried out by personnel from the Army Construction Engineering Research Laboratory (CERL), the Cold Regions Research and Engineering Laboratory (CRREL), and the Waterways Experiment Station (WES). Test managers at the laboratories work with installation co-ordinators in conducting the demonstrations.

A steering group for each of the four major technologies helps to select sites and to conduct the demonstrations; each is chaired by a representative from the Facilities Engineering Division from OACE. Members include technicians from the Army Materiel Command (AMC), Army Forces Command, Army Training and Doctrine Command, and the Army Health Services Command.

Technologies To Be Demonstrated.—Over 35 new technologies will be presented at installations during the five-year life (FY 1984 to FY 1988) of the FTAT program. They will assist installation managers in energy conservation, facility maintenance and repair, pavement and railroad maintenance, and environmental quality. A detailed listing of all FY 1985 FTAT demonstrations is shown in Table 1. Highlights of some of them are described below.

A variety of energy saving technologies will be demonstrated at Army installations in FY 1985. Buildings at Fort Carson, Colorado, and Fort Devens, Massachusetts, will receive exterior insulation systems to reduce excessive heat loss typical of masonry structures. Energy conservation packages for four standard Army building designs will be retrofitted onto buildings at Fort Carson, Colorado. These packages include modifications to HVAC and boiler controls, changes

to air-handling systems, and the use of programmable thermostats. Implementing these techniques throughout the Army could save \$12 million. Alternate energy sources to be demonstrated include diurnal ice storage, use of heat pumps, and coal water slurry.

Facility technology demonstrations will feature new roofing materials and inspection procedures to assist in operating and maintaining buildings. Protected membrane roofs are being installed at several facilities. A voice-activated system for recording and analyzing inspection data is being used at Fort Hood, Texas, and Fort Monmouth, New Jersey. A method for detecting wet roofing insulation through aerial surveys using infrared devices is being demonstrated at Fort Detrick, Maryland, and Fort Wainwright, Alaska.

In the area of pavements and railroads, demonstrations of pothole patching techniques using recycled asphalt were attended by installation personnel and state and municipal engineers at Fort Irwin, California; Fort Belvoir, Virginia; and other facilities. Techniques for hot- and cold-mix recycling of asphalt pavement are being demonstrated at Fort Gillem, Georgia, for an expected 20 percent savings of road reconstruction costs. A 4-inch asphalt underlayer will be placed over 1,400 feet of compacted subgrade at the Red River Army Depot in Texarkana, Texas, to enhance railroad track structures and reduce maintenance costs.

A noise-warning system at Fort Richardson, Alaska, will alert range office personnel to excessive noise levels which may disturb residents of nearby communities. Composting and aerated vault latrines and trickling filters are effectively treating human wastes at remote sites, such as training ranges, without the environmental and health problems of currently used systems. They have been installed at Fort Jackson, South Carolina; Fort Dix, New Jersey; and Fort Greely, Alaska.

The use of these FTAT technologies will result in more cost-effective base management. The Corps estimates that the Army can save \$160 million by implementing dem-

onstrated technologies at all its installations.

Implementing the Technology.— Personnel wishing to implement a FTAT technology at their installation can obtain assistance in several ways. A variety of published information is available on FTAT technologies; fact sheets are one-page summaries of FTAT demonstrations available on each technology; and Technical Reports and brochures describe the technique and its applications to installation users. Videotapes on many FTAT technologies will be available by CY 1986 and will serve as training aids to field personnel.

Valuable first-hand information can also be obtained by attending workshops held in conjunction with some FTAT demonstrations. In FY 1984, over 120 people attended four workshops on pothole patching methods held as part of the

FTAT demonstration. These workshops are usually scheduled several months in advance by laboratory personnel in co-operation with the installations.

Finally, assistance to base personnel is available through the Corps of Engineers Installation Support Program, formerly called "One-Stop." Personnel from Corps laboratories can provide up to two man-days of assistance at no cost to the installation; however, the travel costs of the laboratory personnel must be paid by the requesting agency.

Individuals interested in obtaining information on FTAT activities should contact the FTAT Information Referral Center. It provides initial information on FTAT demonstrations and serves as a liaison between installation personnel requesting information and the technical staff at the Corps laboratories. Requests for information should be

directed to: Commander and Director, U.S. Army Construction Engineering Research Laboratory, ATTN: FTAT Information Referral Center, P.O. Box 4005, Champaign, IL 61821-1305, or by calling (217) 373-7216.



Dr. Donald J. Leverenz is a General Engineer in the Military Programs Section, Directorate of Research and Development, HQS., Army Corps of Engineers. He is the Tests Director of the FTAT program.

Prior to his current position, he spent 10 years as a program manager and research team leader at USA-CERL. There, he conducted research on energy issues, including solar energy system design, computer-aided mechanical design, and the BLAST energy analysis program for buildings. Dr. Leverenz holds B.S. and M.S. degrees in electrical engineering and a Ph.D. degree in nuclear engineering from the University of Illinois, Urbana-Champaign. He is a registered professional engineer in Illinois.

TABLE 1: FTAT DEMONSTRATIONS BEING CONDUCTED IN FY85

Technology	Responsible Corps Lab	Demonstration Site	Environmental Quality Technology Demonstrations		
			Training Area Maintenance Environmental Guidelines for Multi-Purpose Training Areas	CERL	Fort Carson Fort Riley
<i>Pavement and Railroad Technology Demonstrations</i>					
Pavement Recycling	WES	Fort Gillem	Training Area O&M for New Weapons Systems	CERL	Fort Carson
Dustproofing Unsurfaced Roads	WES	Fort Stewart Fort Irwin	Noise Mitigation for Training Ranges	CERL	Fort Richardson Aberdeen Proving Ground
Pothole Patching Using Recycled Asphalt	CRREL	Fort McPherson Fort Gillem Rocky Mountain Arsenal	<i>Energy Technology Demonstrations</i>		
Overlay of Pavements	WES	Fort Sill	Energy Conservation Retrofits for Buildings	CERL	Fort Carson
Structural Enhancement of Railroad Track Structures	WES	Red River Army Depot	Improved Thermal Efficiency of Existing Buildings	CERL CRREL	Fort Carson Fort Devens
Pavement Crack and Joint Sealing	WES	Fort Eustis	High Efficiency Heating System Conversion	CERL	Fort Knox Fort Campbell
			Control of Heat Losses from Underground Heat Distribution Systems	CERL	Fort Jackson
<i>Building Technology Demonstrations</i>					
Roofing System Applications	CRREL	White Sands Missile Range	Energy Recovery from Wastewater Using Heat Pumps	CRREL	Fort Greely
	CERL	Fort Wainwright Fort Devens Fitzsimmons Medical Center	DEH Office Automation	CERL	Fort Leonard Wood
Innovative Roof Maintenance	CRREL	Fort Detrick Fort Hood Fort Wainwright Fort Devens	Diurnal Ice Storage System Demonstration	CERL	Fort Stewart
Automated RPMA Inspection Recording Systems	CERL	Fort Monmouth Fort Hood	Coal Slurry Fuel Conversion Commercial Activities Management System	CERL	TBA TBA
Corrosion Mitigation	CERL	Fort Monroe Fort Ord Fort Riley Fort Devens	Innovative Waste Treatment at Remote Sites	CRREL CERL	Fort Greely Fort Jackson
Cold Applied Roofing Materials	CRREL	Fort Devens	Integrated Air Pollution Control	CERL	Fort Dix Rock Island Arsenal
Overcoating Roofs With Polyurethane Foam	CRREL	Fort Devens	Wastewater Treatment Facility Automation	CERL	Fort Sill
Paint Test Inspection Kit	CERL	Many installations	Trickling Filters Solids Contact Process	CERL	Fort Benning
			Indoor Vehicle Platform Retrofit	CERL	Fort Carson



US Army Corps
of Engineers

Office of the Chief
of Engineers

FTAT Projects

For Information on FTAT Projects
Contact Dr. Gil Williamson,
FTAT Information Manager,
USA-CERL, P.O. Box 4005,
Champaign, IL 61820-1305 217-373-7206

March 1984

INDOOR VEHICLE PLATFORM RETROFIT

Description of Technology. Until recently, tactical maintenance buildings at military installations have generally been constructed rather generically in layout and content and have been of little assistance with some specific items of tactical equipment maintenance. Recently a concept developed by the U.S. Army Construction Engineering Research Laboratory (USA-CERL) called Scheduled Maintenance Platform (SMP) has been introduced into the Military Construction, Army (MCA) program as an add-on facility to specifically handle tactical equipment maintenance.

USA-CERL researchers have identified those features required of a tactical maintenance building which will assist specifically with tactical equipment maintenance. Some of these features include central, high-pressure, hot-water wash equipment; maintenance pit; overhead lift capability; bulk dispensing of grease, oil and antifreeze; a direct waste oil and antifreeze collection system; and specific layout schemes and sizes.

Status of Demonstration. As of January 1985, a general layout of pilot system configuration has been achieved. A feasibility study of the pilot system configuration to be retrofitted into an existing tactical equipment shop has been completed. Building 1692, a maintenance shop at Fort Carson, Colorado, has been selected as the test site. Renovation and equipment installation is currently scheduled for early FY86 with the testing in late FY86.

Benefits of Technology. The tactical equipment building improvements will provide the user with the capability to maintain tactical equipment efficiently and effectively without adverse affect on the environment. Manpower savings are expected to be at least 50 percent with additional savings realized by improvements to fluid dispensing and collection systems. Since the pilot test will be conducted in an existing tactical equipment building, insights will be gained as to the cost of retrofitting these improvements. Considerable maintenance building construction has been completed in recent years. None of these buildings incorporate the features being evaluated here. This demonstration should facilitate remodeling these new buildings to accommodate scheduled vehicle maintenance.

Point of Contact. Mr. L. J. Benson, USA-CERL, P.O. Box 4005, Champaign, IL 61820-1305, COMM 217-373-7253, FTS 958-7253, AV 862-1110 (ask for commercial number), or toll-free 800-USA-CERL (Outside Illinois), 800-252-7122 (Within Illinois).

APPENDIX 3.0 EQUIPMENT SPECIFICATIONS

- 3.1 Commercial Gravity Oil/Water Separator
- 3.2 Hot Water Washer System for Motor Vehicle
- 3.3 High Pressure, Hot Water Washers
 - Hydroblitz
 - Sioux
- 3.4 Fort Lewis Wastewater Treatment Plant

SECTION 02726

(ORB, June 1985)

1. **APPLICABLE PUBLICATIONS:** The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A 36-77a **Structural Steel**

SSPC-SP6-63T Commercial Blast Cleaning

SSPC-DP10-63T Near White Blast Cleaning

595a Colors
& Change Notices
1, 2, 3, 4, 5, & 6

Methods for Chemical Analysis of Water and Wastes (March 1983).

Standard Methods for the Examination of Water and Waste water (15th Addition, 1980).

The purpose of the separator is to remove both free/dispersed oil and suspended solids from vehicle washwater. This washwater is the product of engine and chassis cleaning operations using high pressure hot water washers. These washers DO NOT use detergents or chemical cleaning agents. Washwater from this operation will in all cases flow by gravity to the separator. The soils on the project site can be considered noncorrosive.

3. SEPARATOR PERFORMANCE

3.1 Washwater (Influent) Characteristics:

	minimum	maximum	average
Total Suspended Solids (TSS) mg/1	163	4118	2005
Total Grease and Oils (TGO) mg/1	268	2600	821
Influent temperature	65 degrees F. to 75 degrees F.		
Differential specific gravity between oil and water	0.1		
Maximum flow rate	15 gpm		

3.2 Effluent Characteristics: The separator shall produce an effluent with the following characteristics at maximum flow.

	average	maximum
TSS mg/1	200	300
TGO mg/1	50	100

The ability of the separator to meet this criteria will be validated by tests as described in this section. These tests will be one basis for acceptance or rejection of the separators.

PART 2 - PRODUCTS

4. FUNCTIONAL DESIGN

4.1 General: The separator may be a pre-cast concrete or cast-in-place concrete structure. It shall have an inlet compartment, a parallel plate pack compartment, an outlet compartment, and a skimmed oil compartment. Each compartment shall extend to 6 inches above finish grade and be covered with a steel plate lid, which shall be sectionalized so that no section weighs more than 150 pounds. Each section shall be fastened to the separator by two bolts.

4.2 Inlet Compartment: The inlet compartment shall reduce the incoming suspended solids to a level that will not clog the plate pack. A 50 cubic foot (useful volume) solids storage area shall be provided between the influent pipe and the entrance to the plate pack. The solids storage area shall be measured from the bottom of the compartment to the invert of the influent pipe. The inlet compartment shall provide a uniform flow across the inlet face of the plate pack under laminar flow conditions. The influent pipe shall be located perpendicular to the long axis of the plate pack. The invert shall be no less than two feet six inches below the highest elevation of the adjustable effluent weir. The minimum plan dimension of the inlet compartment, taken at any elevation, shall be two feet by four feet.

4.3 Plate Pack Compartment: This compartment shall contain a readily removable, parallel plate pack. The pack shall be a single unit constructed of fiberglass reinforced polyester plastic. The plates shall be corrugated and parallel with a 3/4 inch clear space between plates. This shall yield an effective surface area of 137 square feet minimum when the pack is installed at an angle of 45 degrees to the horizontal. The inlet and outlet ends of the pack shall have gutters which direct the collected oil and solids upward and downward respectively. Each plate pack shall be equipped with lifting lugs and each lug shall be capable of supporting the entire weight of the pack. The pack shall be installed in the down-flow mode and shall be sealed on the sides to prevent short circuiting between compartments.

4.4 Outlet Compartment: This compartment shall have sufficient volume to prevent resuspension of the solids that have accumulated on the bottom. The sludge storage volume shall be 20 cubic feet as measured from the bottom of the tank to the lowest point of the plate pack. There shall be two fixed troughs, one for the effluent and one for skimmed oil, each equipped with an adjustable weir. Each weir shall be capable of a two-inch vertical adjustment. The effluent pipe shall be six inches diameter minimum. The minimum plan dimension of the outlet compartment, taken at any elevation, shall be two feet by four feet.

4.5 Skimmed Oil Compartment: The separator shall be provided with an integral compartment for the storage of skimmed oil. There shall be a useful volume of 500 gallons. All piping to this compartment shall be a minimum four inches diameter. A two inch diameter vent pipe shall be supplied.

5. STRUCTURAL DESIGN: The separator shall be designed to withstand all static and dynamic hydraulic and soil loading while empty and in operation. Adequate support shall be furnished for all appurtenances and during handling and installation. Design loads shall be as follows:

Weight of water	62.4	PCF
Soil (passive pressure)	35	PCF
Soil (allowable bearing)	3000	PSF
Uniform load on lids and appurtenances	200	PSF

Structural design for reinforced concrete shall conform to SECTION: CONCRETE FOR BUILDING CONSTRUCTION. Structural steel design shall conform to SECTION: STRUCTURAL STEEL. Structural drawings shall be stamped and signed by a licensed professional engineer.

6. MATERIALS

6.1 Steel: Structural steel shall be A-36.

6.2 Concrete and Reinforcing Steel: Shall conform to SECTION: CONCRETE FOR BUILDING CONSTRUCTION.

6.3 Accessories: All bolts, washers, nuts, pins, and screws which require removal for any maintenance of the separator shall be stainless steel.

7. PAINTING: If the separator parts are constructed with structural steel, the following painting is required.

7.1 Surface Preparation: The interior of the separator and all submerged surfaces shall be blast cleaned to near white metal per SSPC-SP10. Exterior surfaces shall be commercial blast cleaned per SSPC-SP6.

7.2 Submerged Surfaces Finish: All surfaces prepared to near white blast shall be coated as follows: Primer and top coat shall be from the same manufacturer.

7.2.1 Primer shall be a polyamide epoxy primer applied to a minimum 2 mils dry film thickness.

7.2.2 Top coat shall be a polyamide epoxy finish applied to a minimum 5 mils dry film thickness. Color shall be snow white, Fed. No. 37886, per Fed Std. 595a.

7.3 Exterior Surface Finish: All exterior surfaces shall be coated as follows: Primer and top coat shall be from the same manufacturer.

7.3.1 Primer shall be an alkyd oil red metal primer applied to a minimum dry film thickness of 2 mils.

7.3.2 Top coat shall be an alkyd finish applied to a minimum dry film thickness of 3 mils. Color shall be sun yellow, Fed. No. 23655, per Fed Std. 595a.

7.4 Execution: Painting shall follow the manufacturer's recommendations and SECTION: PAINTING, GENERAL.

PART 3 - INSTALLATION

8. CONSTRUCTION AND INSTALLATION: Concrete construction shall conform to the requirements of SECTION: CONCRETE FOR BUILDING CONSTRUCTION. Steel construction shall conform to the requirements of SECTION: STRUCTURAL STEEL and SECTION: MISCELLANEOUS METALS. All handling, storage, and installation of materials shall be done in such a manner as to avoid damage. Any damage incurred, including damage to paint finishes, will be repaired.

9. SUBMITTALS: The shop drawings shall be submitted for Contracting Officer approval in accordance with the SPECIAL CLAUSES prior to any separator construction. They shall show all principal dimensions and fittings.

The Contractor shall arrange for a representative of the company manufacturing the separator to inspect, operate and test the unit. The representative shall submit a report to the Contracting Office which shall describe points inspected, tested, any adjustments made and recommendations for preventive maintenance. Included in the report shall be certification that the unit meets the criteria stated herein.

10. TESTING:

10.1 Hydrostatic Testing: The Contractor shall fill the unit with potable water prior to backfilling. The structure shall show no signs of leakage after a 30-minute period. Any leaks shall be repaired and the structure retested.

10.2 Performance Testing: The Contractor will conduct performance tests through an independent laboratory on the separator to verify that it meets the effluent quality criteria set forth in this section. These tests shall be a basis for accepting or rejecting the separator. Test methods will be in accordance with the Standard Methods for the Examination of Water and Wastewater and U.S. E.P.A. Methods for Chemical Analysis of Water and Wastes. Payment for these tests will be made by the Contractor.

END OF SECTION

APPENDIX 3.2

SECTION 15710

HOT WATER SPECIALITIES HOT WATER WASHER SYSTEM FOR MOTOR VEHICLE (ORB, June 1985) PART 1 - GENERAL

1. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1.1 American Society for Testing and Materials (ASTM) Publications:

A 53-8a	Pipe, Steel, Black and Hot-Dipped, Zinc-coated welded and seamless
B 117-73 (R-1979)	Salt Spray Fog Testing

1.2 Society of Automotive Engineers, Inc. (SAE):

100 R1	High Pressure Hose, Single Wire Braided
--------	---

2. GENERAL REQUIREMENTS:

2.1 Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

2.2 Nameplates: Each major item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

2.3 Prevention of Rust: Unless otherwise specified, surfaces of ferrous metal subject to corrosion shall be factory-painted with a rust inhibiting coating. After exposure to salt spray test conforming to ASTM B 117 for 120 hours for interior and 500 hours for exterior use, coating shall show no signs of wrinkling, cracking, or loss of adherence, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark made.

2.4 Equipment Guards and Access: Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts located where personnel contact is possible shall be fully enclosed or guarded. High temperature equipment and piping located within personnel contact or where a potential fire hazard exists shall be properly guarded or covered with insulation of a type specified.

2.5 Verification of Dimension: The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall

advise the Contracting Officer of any discrepancy before performing any work.

2.6 Additional Equipment: Any valves, piping, hoses, etc. that are a part of the manufacturer's standard washer unit that are not required by this specification shall be removed completely, and all openings in the enclosure to be covered with a metal plate(s) to match the color and finish of the enclosure.

3. SUBMITTALS:

3.1 Shop Drawings: Shop drawings shall be submitted to the Contracting Officer for approval in accordance with SECTIONS: SPECIAL CLAUSES and SUPPLEMENTARY REQUIREMENTS, and shall include a complete list of equipment and materials, including manufacturer's descriptive and technical literature; performance charts; catalog cuts; drawings; and instructions necessary for installation of the hot water washer. Shop drawings shall also contain complete piping and wiring drawings and schematic diagrams; equipment layout and anchorage; and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall indicate clearance required for maintenance and operation.

3.2 Spare Parts Data: After approval of shop drawings, and not later than 3 months prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of equipment specified. The data shall include a complete list of parts and supplies, with current unit prices and source of supply and a recommended spare parts list for 1 year's operation.

3.3 Operating and Maintenance Instructions:

3.3.1 Operating instructions outlining the step-by-step procedures required for system start-up and operation shall be furnished. The instructions shall include the manufacturer's names, model numbers, service manuals, parts list, and brief description of all equipment and its basic operating features.

3.3.2 Maintenance instructions listing routine maintenance procedures, possible breakdowns, and repairs shall be furnished. The instructions shall include simplified wiring and control diagrams for the system as installed.

3.3.3 Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventative maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams, and posted beside the diagrams. Proposed diagrams, instructions, and other sheets shall be submitted before posting. The framed instructions shall be posted before

acceptance testing of the systems.

3.4 Performance Test Reports: Upon completion and testing of the installed washer, test reports shall be submitted in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria. Each test report shall indicate the final position of controls.

PART 2 - PRODUCTS

4. MATERIALS AND EQUIPMENT:

4.1 Washer Unit: Washer unit shall be a skid mounted kerosene-fired electrically driven unit capable of delivering washwater at a flow rate of 3.5 gpm at 800 psi discharge pressure. Pump, motor and controls shall be totally enclosed within a cabinet housing of all steel construction. The steel shall be phosphatized and coated with a baked-on polyurethane/enamel industrial plant. Dimensions of the unit shall not exceed 50 inches in length by 21 inches in width by 50 inches in overall height. Total weight shall not exceed 550 pounds.

4.2 Pump: Washwater pump shall be a positive displacement, belt-driven, triplex piston pump with stainless steel poppet valves and seats operating at 960 rpm with 1040 rpm maximum. All wetted parts are to be constructed of stainless steel, hard chrome plated steel, chrome plated brass, viton and Buna N. Splash type, oil bath crankcase lubrication equipped with a window for sight check of oil level. Piston cups are viton, water lubricated on both pressure and suction strokes by unidirectional fluid flow. The pump shall be free from any requirement for external lubrication. Pump lubricating oil shall be SAE 40 weight. Pump also shall be capable of withstanding an incoming water temperature of 160° Fahrenheit. Pump shall be powered by a 2 HP, 60 Hz, 115/230 volt single phase motor of the continuous duty type with permanently lubricated ball bearings, open drip-proof construction and protected from thermal overload. Pump and burner interlock system - unit supplied shall be equipped with a venturi/regulator system equipped with a flow switch to shut burner and pump off in the event of water flow stoppage. Regulator will be set to regulate incoming water line pressure to 20-30 psig. Pump shall be protected from excessive water temperatures by provision of temperature control of bypass flow. This will be accomplished by providing a temperature-sensitive relief valve on the bypass loop when by-pass water temperature reaches 145° Fahrenheit.

4.3 Pressure Hose: Pressure hoses shall be 3/8 inch 10 by 50 feet single wire braided high pressure hose meeting SAE specification 100 R1.

4.4 Disconnect Couplings: The high pressure hose shall be equipped with quick disconnect couplings on both ends for connection into the discharge side of the hot water boiler and the trigger gun control.

4.5 Trigger Gun: Trigger gun control shall be rated at 3,000 psi and 285° Fahrenheit. Gun control provided shall be capable of withstanding a

AD-A165 088

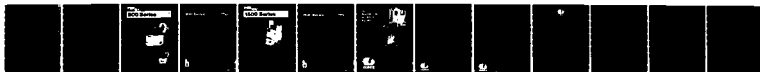
INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS
WASTE AT DOD FACIL. (U) CH2M HILL RESTON VA
T E HIGGINS ET AL. DEC 85 DACA87-84-C-0876

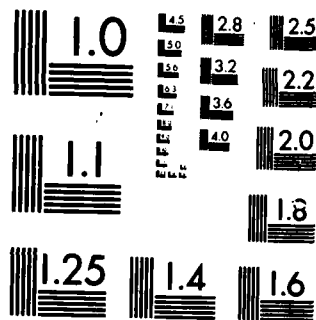
3/3

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

stoppage of the pressurized hot water flow for a minimum of 10 minutes. A spare trigger gun control will be furnished with each unit. Trigger gun shall be equipped with a nozzle with a 15° spray pattern connected to a 1/8 inch street 45° elbow and a 3-foot extension. Connection of extension and spray nozzle to the gun shall be by quick disconnect coupling providing a 360° rotation within the coupling. An additional 15° spray nozzle will be provided for attachment to gun.

4.6 Heating Coil: Heating coil provided in hot water boiler shall consist of between 140 feet and 180 feet of vertical type double pass heating coil. The coil will be fabricated from 5/8 inch ID, A-53 Schedule 40 steel pipe.

4.7 Oil Burner: Oil burner shall be of the pressure atomizing type with automatic electric ignition. Burner shall be sized to provide 125,000 BTU per each gpm of rated washer capacity. A fuel filter and a filter to remove water from the fuel shall be installed in the fuel line ahead of the burner pump. Oil burner shall be thermostatically controlled. The thermostat shall be preset to maintain washwater temperature of 160° Fahrenheit.

4.8 Fuel Tank: Fuel tank shall be all steel construction having a capacity of 20 US gallons and equipped with a fuel sight gage.

4.9 Relief Valve: A safety relief valve shall be installed between the discharge side of the boiler and the high pressure hose. The valve shall be set to discharge when the water temperature reaches 212° Fahrenheit. Discharge from the valve will be piped using Schedule 40 steel pipe to a point 3 inches above the base elevation of the unit.

4.10 Winterization: A plug-in 110/115 volt thermostatically controlled heat trace system shall be provided from the washer inlet to the heater coil inlet to include pump and unloader. An automatic drain valve shall be installed at the lowest point in the water system to drain the water from the heating coil.

PART 3 - EXECUTION

5. HOT WATER WASHER INSTALLATION:

5.1 Skids: Bolt skids to slab with 2-1/2" diameter expansion bolts per skid. Space at quarter points from ends of skids.

5.2 Regulator: Adjust regulator on the incoming water line to 20-30 psig.

6. TESTING: After the components of the washer have been properly adjusted the washer shall be tested to demonstrate that it meets the performance criteria. The tests shall include operating the washer to demonstrate the ability to deliver the quantity of water at the pressure and temperature specified. The tests shall also include the function of the 145° Fahrenheit pump by-pass, 10 minute minimum gun control check, boiler safety relief valve function, and operation of the pressure hose disconnects. If any piece of the equipment fails to pass the tests, the Contractor shall make the necessary repairs or adjustments and the test shall be repeated until satisfactory performance is achieved.

END OF SECTION

800 Series

**High
Pressure
Cleaner**

Hydro Blitz 800 Series High Pressure Cleaners are heavy duty, dependable, medium volume-pressure machines built to withstand the demands of bigger, continuous cleaning operations. Many years of field operation have proven their effectiveness; they stand up to those tough cleaning jobs and cut the man-hours needed to get high quality results. Hospitals, farms, food processing plants, dairies, large and small industrial plants, trucks, aircraft, ships, and road construction equipment are only a few of the locations where maintenance personnel deal with tough cleaning problems every day and these workhorses are an ideal solution.

Dependable and Convenient

Hydro Blitz 800 Series machines are powered by dependable 2 or 3 horsepower motors driving a triplex piston, positive displacement pump. These high quality, smooth-operating pumps provide trouble-free use and minimize downtime. All pumps are protected from hot water damage due to prolonged by-pass circulation when the trigger gun is closed by a Pump Guard thermal relief valve. Model 08357 plugs into any standard 20 amp 115 V. circuit for convenient use almost anywhere. Model 08410, with higher GPM flow and working pressure, requires a 230 V. 10 circuit. The float tank design of the water inlet system assures that water is always available to the pump despite flow or pressure changes that may occur in the water supply.

Accurate and Versatile

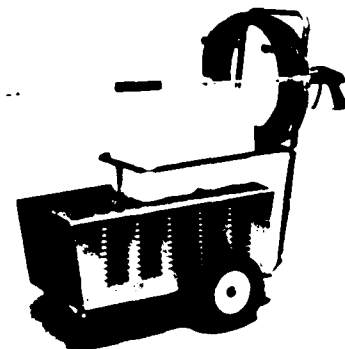
The float tank also assures that there is a steady, positive flow of water to the built-in chemical injection system for accurately mixing chemical concentrate with water to the desired use dilution. No more costly chemical waste! When the machine will remain stationary in one location for use, it can be mounted right on top of a 55-gallon drum. Where mobility is desired, an optional wheel kit, which includes a convenient chemical storage rack for two 5-gallon pails, can be factory installed. Whichever you select, the chemical supply is always readily available.



Model 08357 shown with optional chemical jugs and wheel kit

Special cleaning applications often call for hot water to boost cleaning power. A Hot Water Inlet package can be factory installed to permit the use of hot water without concern for pump damage. Jobs which require two chemicals are not a problem either with an optional field installed Dual Chemical Kit. Change easily from a high pressure cleaner to a powerful foamer by replacing the spray wand with a Foam Wand accessory. Thick, rich, clinging foam gets through the dirtiest jobs!

When the job calls for high pressure cleaning, choose Hydro Blitz, the high quality, dependable line of pressure cleaning equipment.



Model 08357 shown with stainless steel cover (optional)

800 Series

HYDROBLITZ

Technical Specifications

Pump—3-piston triplex, positive displacement, oil bath crankcase.

Pump Guard*—Thermal relief valve to protect pump from damage caused by hot water generated during by-pass recirculation when trigger gun is closed.

Motor—60 Hz., single phase, sealed bearings, thermal overload protection.

Drive—Industrial strength sheaves and belts.

Water Inlet/Chemical System—Float tank standard; regulator / venturi with hot water option. Assorted metering tips for selection of desired chemical concentration. Wash solution sprayed at high pressure.

Temperature Range—Maximum inlet water temperatures 150° F. Hot water option permits use of inlet water temperature up to 180° F.

Chemical Compatibility—Safe for all neutral and alkaline detergents. For use with acids, Pump Saver* Injector must be added to protect pump from acid damage.

Pulsation Dampener—Spiral braid flex hose.

Cabinetry—Phosphatized steel with polyurethane / enamel paint.
*Heavy gauge stainless steel cover optional.

Pressure Hose— $\frac{3}{4}$ " x 50 ft. 100 R1 single wire braid. Pressure rating: 2250 PSI working; 9000 PSI burst.

Gun and Wand—Shut-off at trigger gun. 3 ft. nickel-plated steel wand with insulated grip; wand extension optional.

Nozzle—Hardened stainless steel.

Wheels and Handle—Optional.

Overall Dimensions—Cabinet only: 31" L x 16 $\frac{1}{2}$ " W x 12 $\frac{1}{2}$ " H. With handle/wheels: 38" L x 22" W x 41" H.

Shipping Weight—150 # (approx.)

Model Specifications

Model	Flow (GPM)	Pressure (PSI)	Pump	Horsepower (H.P.)	Voltage & Phase	Amps	Pump Guard	Water Inlet/Chemical System	Gun	Hose	Wand	Wheels & Handle
08357	3.5	700	Triplex Piston	2	115 V. 10	20	Std.	Float Tank	Trigger	$\frac{3}{4}$ " x 50 ft.	3 ft.	Optional
08410	4.0	1000	Triplex Piston	3	230 V. 10	14	Std.	Float Tank	Trigger	$\frac{3}{4}$ " x 50 ft.	3 ft.	Optional

Distributed by:



Hydro Systems Company

3798 Round Bottom Road

Cincinnati, Ohio 45244

(513) 271-8800

Telex 241488

Order and message recorder (513) 272-1237 24 hours / 7 days a week.

HYDRO BLITZ

1500 Series

High
Pressure
Cleaner

Hydro Blitz 1500 Series High Pressure Cleaners have blistering cleaning power. With hot water to boost the chemical action, even the most difficult cleaning jobs can be finished faster and more efficiently. That all adds up to big cost savings in labor, time and chemicals. The hot spray wash and rinse reduce those tough cleaning problems in large and small industrial plants, and food processing plants, large institutions, on farms, with trucks, buses, ships, airplanes and heavy construction equipment down to a manageable task. These high energy machines are capable of handling any cleaning problem faster and easier than ever before.

Dependable and Convenient

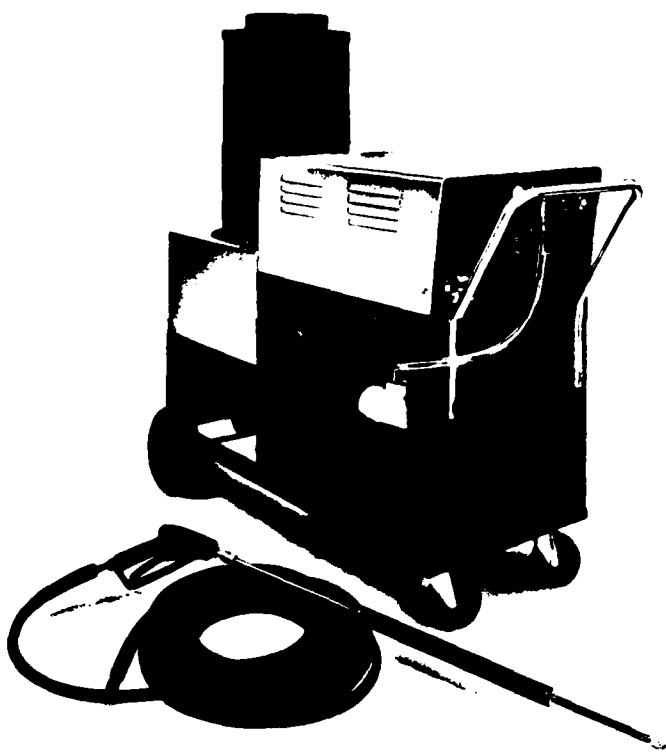
Hydro Blitz 1500 Series machines are powered by heavy duty motors driving a triplex pump. These high quality, smooth operating pumps provide trouble-free use and minimize down-time. The pump is protected from damage caused by recirculating hot water when the trigger gun is closed by a Pump Gard™ thermal relief valve. The medium pressure-volume units use a 25 amp 115 V. 10 circuit. The high energy models require a 230 V. 10 or 30 circuit. The float tank design of the water inlet system assures that water is always available to the pump despite flow or pressure changes which may occur in the water supply.

Accurate and Versatile

The float tank also assures that there is a steady, positive flow of water to the built-in chemical injection system for accurately mixing chemical concentrate with water to the desired use dilution. No more costly chemical waste! Convenient chemical storage is provided for pails or jugs to make sure a chemical supply is always available. Kerosene, #1 fuel oil, LP or Natural Gas models are available in all output

ranges. This gives the operator a wide selection of energy sources to choose from according to his needs. Also, the burner may be turned off if hot water is not desired and the machines will operate at the same flow and pressure. When mobility is desired, an optional wheel kit can be factory installed. Jobs which require two chemicals are not a problem with an optional field installed Dual Chemical Kit. Change easily from a high pressure cleaner to a powerful foamer by replacing the spray wand with a Foam Wand accessory. Thick, rich, clinging foam gets through the dirtiest jobs!

When the job calls for high pressure cleaning, choose Hydro Blitz, the high quality, dependable line of pressure cleaning equipment.



Model 15410 shown with optional chemical jug and wheel kit

1500 Series

HYDROBLITZ

Technical Specifications

Pump—Triplex, positive displacement, oil bath crankcase.

Pump Guard—Thermal relief valve to protect pump from damage caused by hot water generated during by-pass recirculation when trigger gun is closed.

Motor—60 Hz., sealed bearings, thermal overload protection.

Drive—Industrial strength sheaves and belts.

Water Inlet/Chemical System—Float tank. Assorted metering tips for selection of desired chemical concentration. Wash solution sprayed at high pressure.

Temperature Range—Maximum water inlet temperature 150° F.

Oil Burner—Pressure atomizing, forced air, automatic electric ignition. Maximum temperature rise: 120° F. Burns #1 fuel oil or kerosene; 13.5 gal. fuel tank.

Gas Burner—AGA approved; thermocouple pilot safety shut-off. Automatic pilot relighter. LPG units: two external regulators; Natural Gas units: regulator built into fuel control valve.

Burner Controls—Thermoswitch: sensitive, minimum deadband control, 100°-180° adjustable; vacuum switch shuts down burner when trigger gun is closed.

Heating Coil—Vertical; 163 ft. of A-53 Schedule 40, ½" I.D. steel pipe.

Chemical Compatibility—Safe for all neutral and alkaline detergents. For use with acids, Pump Saver® Injector must be added to protect the pump from acid damage.

Pulsation Dampener—Spiral braid flex hose.

Cabinetry—Phosphatized steel with polyurethane/enamel paint.

Pressure Hose—100 R1 single wire braid.

Models 15210, 15211, 15212—¾" x 25 ft.

15357, 15358, 15359

Models 15410, 15411, 15412—¾" x 50 ft.

15420, 15421, 15422

Pressure ratings: 2250 PSI working; 9000 PSI burst.

Models 15515, 15516, 15517—½" x 50 ft.

Pressure ratings: 2000 PSI working; 8000 PSI burst.

Gun and Wand—Shut-off at trigger gun. Nickel-plated steel wand—3 ft. for Models 15210, 15211, 15212, 15357, 15358, 15359; 6 ft. for Models 15410, 15411, 15412, 15420, 15421, 15422, 15515, 15516, 15517; wand extension optional.

Nozzle—Hardened stainless steel.

Wheels and Handle—Optional.

Overall Dimensions—50" L x 21" W x 50" H.

Shipping Weight—620 # (approx.)

Model Specifications

Model	Fuel	Flow (GPM)	Pressure (PSI)	Pump	Horsepower (H.P.)	Voltage & Phase	Amps	Pump Guard	Water Inlet/Chemical System	Gun	Hose	Wand	Wheels & Handle
15210	Kerosene	2.5	1000	Triplex Piston	2	115 V. 1Ø	21	Std.	Float Tank	Trigger	¾" x 25 ft.	3 ft.	Optional
15211	Nat. Gas												
15212	LP Gas												
15357	Kerosene	3.5	700	Triplex Piston	2	115 V. 1Ø	23	Std.	Float Tank	Trigger	¾" x 25 ft.	3 ft.	Optional
15358	Nat. Gas												
15359	LP Gas												
15410	Kerosene	4.0	1000	Triplex Piston	3	230 V. 1Ø	16	Std.	Float Tank	Trigger	¾" x 50 ft.	6 ft.	Optional
15411	Nat. Gas												
15412	LP Gas												
15420	Kerosene	4.0	2000	Triplex Plunger	5	230 V. 3Ø	16	Std.	Float Tank	Trigger	¾" x 50 ft.	6 ft.	Optional
15421	Nat. Gas												
15422	LP Gas												
15515	Kerosene	5.0	1500	Triplex Plunger	5	230 V. 3Ø	16	Std.	Float Tank	Trigger	½" x 50 ft.	6 ft.	Optional
15516	Nat. Gas												
15517	LK Gas												

Distributed by:



Hydro Systems Company

3798 Round Bottom Road

Cincinnati, Ohio 45244

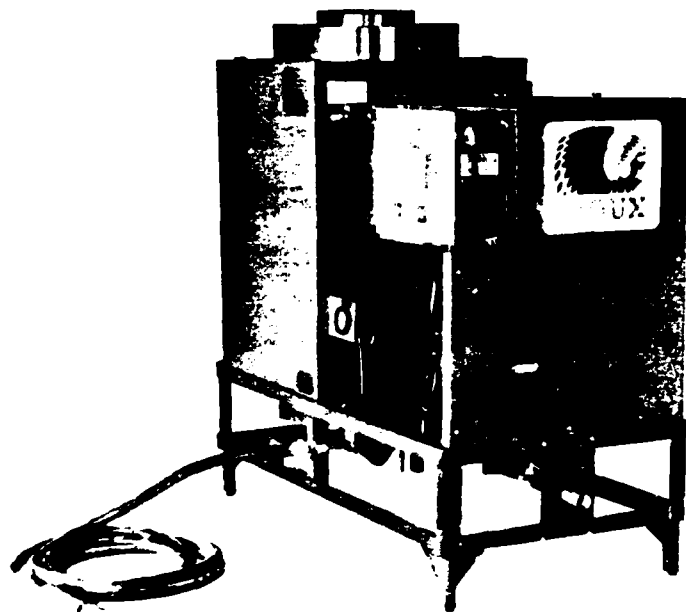
(513) 271-8800

Telex 241488

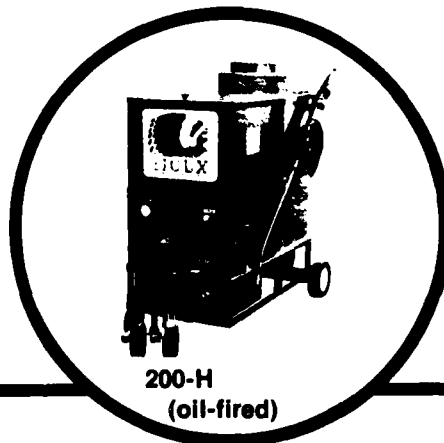
Order and message recorder (513) 272-1237 24 hours / 7 days a week.

SIoux HIGH PRESSURE HOT WATER WASHER

**SCHOOL BUSES
METAL WORKING
MACHINERY
AIRPLANES
HANGARS
POWER MOWERS
GARBAGE TRUCKS
TRUCK STOPS
MARINAS
SMALL ENGINE
REPAIR SHOPS
SLAUGHTER HOUSES
REFRIGERATED
TRAILERS
SIGNS
ZOOS**



**300-H
(gas-fired)**



**200-H
(oil-fired)**

The Sioux Series H Hot Water Washer features speed in cleaning! Cleaning capability is much greater than conventional cold water cleaners because the higher temperatures increase the power of detergent to "eat up" grime. Hot water provides greater action for detergents and chemicals to dissolve deposits and cut films that cold water can't touch.

Discharge Temperature to 200° F.

Pressure available from 500 to 1000 PSI.

Cold water to hot water in 2 minutes.

Portable or Stationary Mounting.

Straight Spray Wand and minimum 35' heavy duty hose with interchangeable tips.

Light weight, easy to handle gun & hose.

Complete. Ready to operate.

CHECK THESE FEATURES:

- Heavy-duty construction
- Large stainless steel detergent reservoir
- Large stainless steel float tank
- Electronic ignition
- Replaceable coil tested to 1000 psig
- Pressures to 1000 psig in standard construction, special units available
- Choice of firing: oil, natural gas, LP gas



"Quality Since 1939"

MODEL	200-H	250-H	251-H	300-H	301-H	350-H	351-H
Capacity, gallons per hour	120	180	180	240	240	360	300
BTU per hour OUTPUT	145,000	230,000	230,000	290,000	290,000	435,000	362,000
Discharge Pressure, PSIG	500	500	1000	600	1000	500	1000
STANDARD CONSTRUCTION AND EQUIPMENT	Oil Gas	Oil Gas	Oil Gas	Oil Gas	Oil Gas	Oil Gas	Oil Gas
Frame Construction: welded 14 gauge steel & angle iron, brass and malleable iron fittings	x x	x x	x x	x x	x x	x x	x x
Features: Temperature limit switch, relief valve, glycerin-filled pressure gauge, pulsation dampeners, flow control switch	x x	x x	x x	x x	x x	x x	x x
Water System: Positive hydraulic flow, non back-siphoning. Fine mesh strainers. Replaceable detergent and water lines	x x	x x	x x	x x	x x	x x	x x
Inlet Float Tank: Stainless steel, capacity, gallons: gravity feed to pump, 1/2" float valve, mesh strainer	2.5	4.0	4.0	6.4	6.4	6.4	6.4
Detergent Tank: Stainless steel, capacity, gallons: fill valve, detergent metering valve, replaceable check valve, mesh strainer	11	18.4	18.4	28	28	28	28
Finish: Red oxide undercoat, red enamel finish	x x	x x	x x	x x	x x	x x	x x
Cleaning Gun: 4' offset with swivel grips and 0°, 15°, 25° tips	x x	x x	x x	x x	x x	x x	x x
Discharge Hose: high pressure hose with fittings	1/4"x35'	3/8"x35'	3/8"x50'				
	x x	x x	x x	x x	x x	x x	x x
Electric Motor: Drip-proof, overload protection, capacitor start, rubber vibration dampeners, direct drive:							
115/1/60, HP	3/4	1					
belt drive: 230/1/60, HP			2	2		2	
belt drive: 230/3/60, HP					3		5
Pump: SIOUX twin piston, positive displacement, oil-lubricated stainless pistons	x x	x x					
TRI-PLEX, positive displacement, oil-filled crankcase, stainless piston			x x	x x	x x	x x	x x
Coil: Replaceable. Electrically welded, cold rolled steel tubing, tested 3 ways to 1000 PSIG, vertical mounting for natural venting. Diameter size tubing	3/4"	3/4"	3/4"	3/4"	3/4"	7/8"	7/8"
Burner Gas: multi-orifice, naturally aspirated	x	x	x	x	x	x	x
Burner, Oil: Pressure fuel system, positive forced air, adjustable pressure, automatic spark ignition, 10,000 V moisture-proof transformer, totally enclosed motor:							
1/5 HP model	x	x	x	x	x		
1/3 HP model						x	x
FUEL OIL TANK CAPACITY, gallons	9	11.2	11.2	24.9	24.9	24.9	24.9
Portable Mounting: Semi-pneumatic tired-wheels							
2.5 x 8"	4	4					
cushioned rubber wheels:							
4 x 10"			4	4	4	4	4
Weight: Net	460/478	520/465	535/460	700/625	690/625	800/750	850/750
Weight: Shipping, approximately	490/515	585/535	575/500	775/725	800/750	900/850	1075/975
Dimensions, Shipping:							
53" L x 21" W x 45" H	x x						
46" L x 24" W x 48" H		x					
73" L x 38" W x 59" H			x x	x x	x x	x x	x x

OPTIONS: Alternate Electricals, Stationary Mounting, Trigger Control Wash Gun, Dual Gun Manifold, Pressure Control, Chemical Injection Pump, Engine Generator, Heavy-duty 2-wheel or 4-wheel Over-the-Road Trailers, Oil-fired, Flame Safeguard SEE ACCESSORY SHEET FOR ADDITIONAL OPTIONS.

The Corporation reserves the right to make such changes as deemed advisable which represent improvement of performance and/or reliability of equipment

No portion of this literature may be reproduced without express permission of SIOUX STEAM CLEANER CORPORATION.

Sioux Cleaners Are Also Designed, Upon Request, To Meet Specific Needs Of The Purchaser.



SIOUX STEAM CLEANER CORPORATION
 Sioux Plaza
 BERESFORD, SOUTH DAKOTA 57004
 Telephone (605) 763-2776

MODEL

Capacity, gallons per hour

BTU per hour OUTPUT

Discharge Pressure, PSIG

STANDARD CONSTRUCTION AND EQUIPMENT**Frame Construction:** Welded 14 gauge steel
and angle iron, brass and malleable iron fittings**Features:** Temperature limit switch,
relief valve, glycerine-filled
pressure gauge, flow control switch, pulsation dampeners**Water System:** Positive hydraulic

flow, non back-siphoning

Elevated above water pumps for flooded
suction and gravity feed**Inlet Float Tank:** Stainless steel,

capacity in gallons

Gravity feed to pump, 1/2" float
valve, mesh strainers**Detergent Tank:** Stainless steel, capacity in gallons

Fill valve, detergent metering valve,

replaceable check valve, sediment strainer

Finish: Red oxide undercoat, red enamel finish**Cleaning Gun:** 4' offset with rubber

grips and 0°, 15°, 25° tips

Discharge Hose: 1-wire braid, with fittings,

1/4" x 50'

3/8" x 50'

Electric Motor: Open drip-proof, thermally protected

115 1/60 or 230 1/60, HP

230-460 3/60, magnetic start, HP

Pump: Twin piston, positive displacement,

oil-bath crankcase, stainless pistons

and valves, direct drive

Triplex ceramic plunger pump, positive displacement,

oil-bath lubricated, stainless valves, belt drive

Coil: Replaceable, electrically welded, cold

rolled steel tubing, vertical mounting

for natural venting, tubing dia. inches

Burner, Gas: Multi-orifice, naturally aspirated,

self monitoring, solid state ignition system

Burner, Oil: Pressure fuel system, positive

forced air, high voltage ignition

system, moisture-proof, totally

enclosed motor, 1/5 HP

1/3 HP

Fuel Oil Tank: Capacity, gallons**Portable Mounting:** Steerable front axle and

towbar, 2 5/8" semi-pneumatic tired wheels

16" pneumatic tired wheels

Weight: Net pounds**Shipping Weight:** Approximate pounds**Shipping Dimensions:**

43"Lx21"Wx45"H

73"Lx38"Wx59"H

221-H**355-H**132
160,000
1,000300
362,000
1,500

Oil	Gas	Oil	Gas
X	X	X	X
X	X	X	X
X	X	X	X
2 5	2 5	6 4	6 4
X	X	X	X
11	11	28	28
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
1 5	1 5	5	5
X	X		
		X	X
3 4	3/4	7/8	7/8
	X		X
X		X	
9		24 9	
X	X	X	X
460	425	825	725
495	460	1045	950
X	X	X	X

OPTIONS: Alternate Electricals, Stationary Mounting, Trigger Control Wash Gun, Dual Gun Manifold, Pressure Control, Chemical Injection Pump, Engine Generator, Heavy-duty 2-wheel or 4-wheel Over-the-Road Trailers, Oil-fired Flame Safeguard SEE ACCESSORY SHEET FOR ADDITIONAL OPTIONS

The Corporation reserves the right to make such changes as deemed advisable which represent improvement of performance and or reliability of equipment

No portion of this literature may be reproduced without express permission of SIOUX STEAM CLEANER CORPORATION

Sioux Cleaners Are Also Designed, Upon Request, To Meet Specific Needs Of The Purchaser.



"Quality Since 1939"

SIOUX STEAM CLEANER CORPORATION**Sioux Plaza****BERESFORD, SOUTH DAKOTA 57004****Telephone (605) 763-2776****TELEX: 9103800956**



GENERAL SERVICES ADMINISTRATION
FEDERAL SUPPLY SERVICE
AUTHORIZED FEDERAL SUPPLY SCHEDULE PRICE LIST
PRICES SHOWN HEREIN ARE LIST FOB DESTINATION

Federal Supply Schedule FSC GROUP 49, Part II MAINTENANCE & REPAIR SHOP EQUIPMENT
FSC Class: 4940 - CLEANING EQUIPMENT

Contract Number: GS07F13047

Contract Period: April 1, 1985 through March 31, 1986

CONTRACTOR: SIOUX STEAM CLEANER CORPORATION
Sioux Plaza
Beresford, South Dakota 57004
1-605-763-2776

Size: Small Business

AMENDMENT TO CONTRACT NUMBER GS07F13047

SUPPLEMENT NO. 1 - Effective July 25, 1985

NET PRICES OFFERED TO THE GOVERNMENT
FOB DESTINATION

Special Item 239-7

Model No	Description	Price each 1 unit	Price each 2 units	Price each 3+units
200-H	Hot High Pressure, Gas or Oil	\$ 1296	\$ 1215	\$ 1053
250-H	Hot High Pressure, Gas or Oil	1559	1462	1267
221-H	Hot High Pressure, Gas or Oil	1768	1658	1437
251-H	Hot High Pressure, Gas or Oil	2039	1912	1657
300-H	Hot High Pressure, Gas or Oil	1879	1762	1527
301-H	Hot High Pressure, Gas or Oil	2238	2099	1819
350-H	Hot High Pressure, Gas or Oil	2191	2054	1780
351-H	Hot High Pressure, Gas or Oil	2564	2404	2083
355-H	Hot High Pressure, Gas or Oil	3196	2996	2597

ALL OTHER SPECIAL ITEM PRICES REMAIN SAME AS STATED ON ORIGINAL CONTRACT PRICE LIST

APPENDIX 3.4

FT. LEWIS SEWAGE TREATMENT PLANT UNIT CAPACITY (page 1 of 3) (USACE, Sacramento District, December 1972)

Component	Determination of Capacity	Capacity	
		Average	Peak
Bar screens, rakes, sewage shredders	Hydraulic capacity per construction specs 2 x 7.0 mgd = 14.0 mgd at peak	--	14 mgd
Grit chamber	Hydraulic capacity based on 1 fps at peak flow. 1 fps x 1.5' x 20' x 60 $\frac{S}{M}$ x 1440 $\frac{M}{D}$ x 7.48 $\frac{gal}{CF}$ = 19.4 mgd	--	19.4 mgd
Primary clarifiers	Hydraulic capacity based gsfpd on overflow, rates 4 x 24' x 100' x 800 gsfpd = 7.7 mgd @ ave. 4 x 24' x 100' x 1200 gsfpd = 11.5 mgd @ peak	7.7	11.5 mgd
Primary effluent	Hydraulic capacity based on weir rates 4 x 63' x 20,000 gsfpd = 5.0 mgd @ peak	--	5.0 mgd
Trickling filters	Hydraulic capacity based on capacity with largest pump out of service 2 @ 11 mgd, 1 @ 5.8 mgd; 11 + 5.8 = 16.8 mgd Hydraulic capacity of rotors without recycle per construction specs $\frac{M}{D}$ = 22.2 mgd 2 x 7700 gpm x 1440 $\frac{M}{D}$ = 22.2 mgd	--	16.8 mgd 22.2 mgd
BOD ₅ loading capacity in population equivalents (assume primary clarifiers removed only 20% of BOD ₅ from raw sewage due to hydraulic overload of primary clarifiers)			
$2\pi (40.83 \text{ ft})^2 \times 22.1 \text{ ft} \times .050 \frac{\text{lb BOD}_5 \text{ to filter}}{\text{CF} \cdot \text{Day}} = 85,300 \text{ people}$			
$\frac{0.8 \text{ lb BOD}_5 \text{ to filter}}{\text{lb BOD}_5 \text{ in raw sewage}} \times \frac{0.17 \text{ lb BOD}_5 \text{ in raw sewage}}{\text{person} \cdot \text{day}}$			

NOTE: Refer to Figure 17, page 7-17, for Treatment Plant Site Plan and Flow Diagram.

Component	Determination of Capacity	Capacity	
		Average	Peak
Secondary clarifier	Hydraulic capacity based on overflow rates $2 \pi (45 \text{ ft})^2 \times 600 \text{ gsfpd} = 7.6$		
	$2 \pi (45 \text{ ft})^2 \times 1200 \text{ gsfpd} = 15.2 \text{ mgd}$	7.6	15.2 mgd
Chlorinator	Hydraulic capacity based on weir rates $2 \times (2\pi 40 + 2\pi 30) \times 15,000 \text{ gpfpd} = 14.7 \text{ mgd}$	--	14.7 mgd
	Dosage capacity based on construction specs $\frac{2000 \text{ lb/D}}{10 \text{ mg/l} \cdot 8.34} = 24 \text{ mgd}$	--	24 mgd
Chlorine contact tank	Hydraulic capacity based on detention time $(2 \times 11' \times 100.3' \times 8' + 2 \times 14' \times 100.3' \times 8') \times 7.48 \frac{\text{g}}{\text{CF}} \times 1440 \frac{\text{m}}{\text{d}} = 14.4 \text{ mgd}$ 30 min.	--	14.4 mgd
Outfall	Hydraulic capacity based on maximum high water 6.4' above MLLW with last manhole surcharged to 25' above MLLW (i.e., just below manhole lid)	--	19.6 mgd
Sludge thickener	Sludge capacity in population equivalents' $\pi (22.5 \text{ ft})^2 \times 20 \frac{\text{lb. solids}}{\text{SF.D}} = 79,500$ $\frac{0.2 \text{ lb solids}}{\text{person}}$	--	
Sludge digester	Digester capacity based on heating sludge to speed digestion; in population equivalents:		
	Primary digester ¹ 70,780 cf Primary digester ² 111,606 cf Secondary digester 70,780 cf		
	$253,166 \text{ cf} \div 4 \frac{\text{cf}}{\text{person}} = 63,000 \text{ people}$	--	63,000 people

Component	Determination of Capacity	Capacity	
		Average	Peak
Sludge drying beds	Sludge capacity in population equivalents $\frac{24 \times 29.2' \times 100'}{1.0 \text{ sf person}} = 70,000 \text{ people}$	--	70,000 people

References:

Metcalf & Eddy
 10 State Standards
 EPA Technical Trans. Sludge Handling
 EPA Technical Trans. Suspended Solids Removal
 ASCE MOP #9

Population Equivalent = 100 gpcd
 0.17 lb BOD₅/day
 0.20 lb Suspended Solids/day